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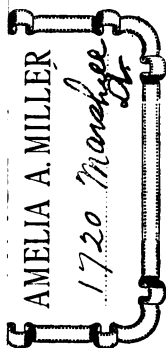
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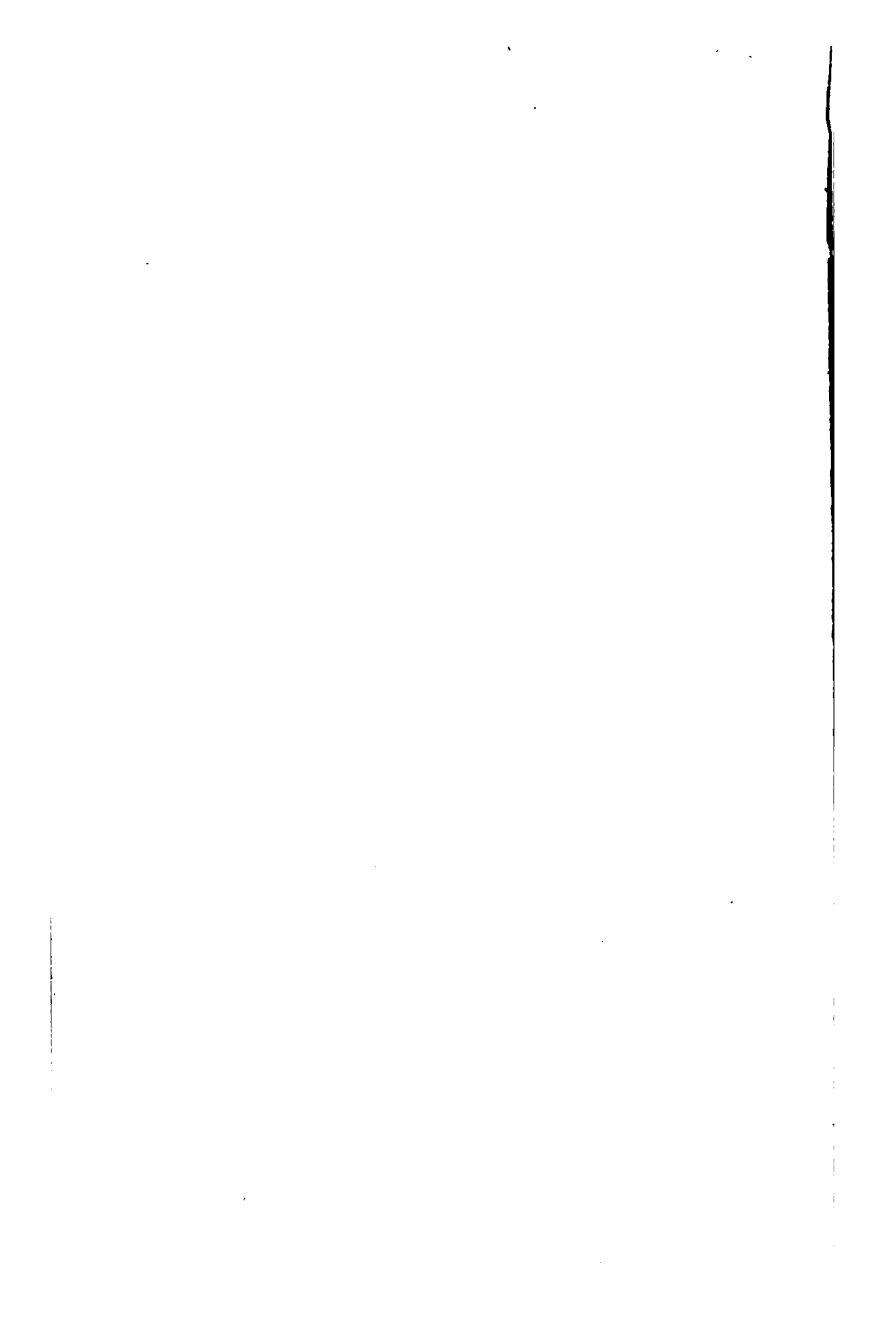
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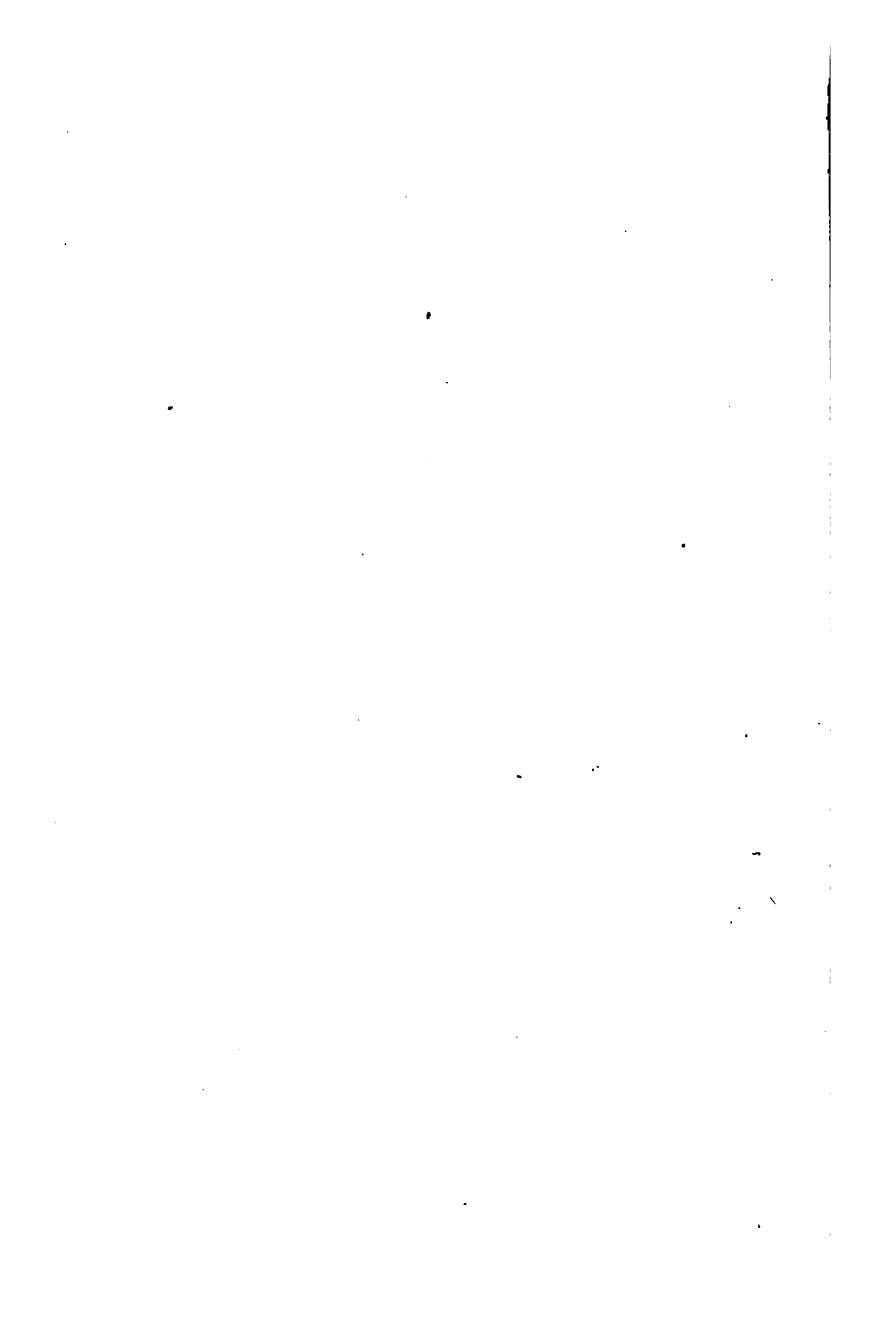
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TO

F R E N C H ' S

COMMON SCHOOL ARITHMETIC.

---

FOR THE USE OF TEACHERS.

---

BY

JOHN H. FRENCH, LL.D.

NEW YORK:  
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1876.



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## P R E F A C E.

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MANY teachers object to the publication of a Key to any mathematical work, on the ground that a person who is competent to give instruction in any branch of mathematics, is competent to do so without the aid of a Key to the text-book. While this ground is true, it does not follow that a Key may not, at times, be of value even to the most competent instructors. The manner in which such a work is used makes it valuable or prejudicial to the interests of teachers and pupils.

A teacher is many times unable to carefully review a lesson in advance of the class, for the purpose of making thorough preparation for conducting the recitation; and sometimes the attention of the teacher is necessarily divided between a class and the other pupils in the school-room; and hence, when a pupil encounters a difficulty in recitation, it not unfrequently happens that the teacher is not able at the moment to give the needed aid as promptly as it should be given. Again, when the result or "Answer" to a problem is not given in the text-book, pupils will sometimes fail to agree on the result. And again, young teachers who are using a text-book which they have not previously studied as pupils nor used as teachers, sometimes find themselves "at sea," when preparing for

or conducting a recitation. Under any of these circumstances, a Key may be judiciously used by the teacher, without injury to the school.

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In short, a teacher should never depend upon a Key as a substitute for study and thought; but he should use it as an aid in acquiring correct methods of solution and explanation, and as a temporary help, when unavoidably prevented from making thorough preparation to conduct a recitation.

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KEY  
TO  
COMMON SCHOOL ARITHMETIC.

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CHAPTER I.  
I N T E G E R S .

SECTION II.

*NOTATION AND NUMERATION.*

*EXERCISES.*

1. Ten, thirty, seventy, twenty-three, ninety-nine, sixteen, eleven, twelve.

2. One hundred, four hundred, seven hundred, three hundred fifty, two hundred eighty, one hundred ninety.

3. Five hundred ninety-six, two hundred eighty-one, six hundred ninety-four, three hundred seventy-five, three hundred thirty-three, eight hundred ninety-nine.

4. One hundred eight, nine hundred four, three hundred one, seven hundred seven, five hundred ten, eight hundred eleven, six hundred, one hundred fifty.

5. 50, 90, 41, 66.      6. 14, 100, 400, 600.      7. 260, 590.

8. 710, 326.              9. 581, 615.              10. 204, 503.

11. 706, 801.              12. 650, 712.              13. 563, 290.

14. 119, 999.

15. Five thousand ; four thousand two hundred ; one thousand three hundred sixty ; six thousand three hundred eighty-four ; three thousand five hundred sixty-nine ; eight thousand one hundred thirteen.

16. Nine thousand eleven; five thousand six hundred eight; three thousand eight; one thousand forty; four thousand seventy-six.

17. Thirty thousand; fifty-seven thousand; forty-two thousand three hundred; sixty-five thousand eight hundred fifty; eighty-three thousand two hundred ninety-four.

18. Fifteen thousand two hundred three; forty-seven thousand fifty-six; fifty thousand nine hundred twelve; ninety thousand fifty-two; eighty-nine thousand five.

19. Eighty thousand six; twenty-five thousand thirty; sixty thousand two hundred nine; forty thousand four hundred seventy-five; thirty thousand eight hundred; fifty-five thousand seven hundred sixty-three.

20. 2,000; 7,500.

21. 4,160.

22. 9,653.

23. 3,811.

24. 7,041.

25. 1,001; 2,050.

26. 5,409.

27. 16,500.

28. 81,270.

29. 11,985.

30. Two hundred seventy-five thousand; one hundred thousand; eight hundred sixty thousand; four hundred ninety-three thousand six hundred; eight hundred fifteen thousand three hundred fifty.

31. 200,000.

32. 650,800.

33. 109,726.

34. 105,080.

35. Four million; eight million; seventy-three million; nine million seven hundred twenty-one thousand three hundred twelve.

36. Eighteen million two hundred seventy-one thousand one hundred; three hundred million; two hundred fifty-three million seven hundred twenty-nine thousand five hundred ninety-four; six hundred four million.

37. 9,000,000; 14,000,000.

38. 452,000,000.

39. 901,000,000.

40. 300,265,000.

41. 509,612,985.

42. Four billion three hundred fifty-nine million six thousand one hundred ten; nineteen billion; forty billion sixty million one hundred thirty-nine thousand one hundred ninety-four.

43. Five billion two hundred thirty-six million four hundred eighty-one thousand two hundred seventy-nine; ten billion five hundred million six hundred thousand; ninety-two billion six hundred seventy-five million two hundred forty-four thousand.

44. Three quadrillion; three hundred ninety-six billion seven hundred twenty-eight million one hundred thirty-six thousand two hundred ninety-four.

45. Seventeen billion two hundred fifty-two million five thousand thirty; eighteen million thirty-nine; four hundred ten billion sixty thousand.

46. 5,200,022,008.

47. 45,115,164,089.

48. 52,000,000,000,000.

49. 109,000,000,000,000,000.

50. 9,000,306,000.

51. 478,234,008,516,700,508.

52. 619,000,030.

53. Eighty; two hundred ninety; seven hundred sixty-three; four hundred nine; seven thousand; two thousand nine; five thousand eighty.

54. Nine thousand three hundred ninety-three; six thousand five hundred; fifty thousand; eighty-three thousand four hundred; fourteen thousand eight; ten thousand eighty-six.

55. Five hundred twelve thousand six hundred ninety-four; eight hundred nine thousand one hundred twenty-three; five hundred fifty-nine thousand twenty-six; three hundred thousand six; one hundred ten thousand ninety.

56. 80; 200; 910.

57. 55; 716; 401.

58. 8,000; 50,000; 92,000.

59. 612,165.

60. 15,017.

61. 400,056.

62. 60,000,000; 700,000,000.

63. 182,355,488.

64. 209,018,910.

65. Three hundred twenty million two hundred ninety-six; two hundred million one hundred sixty-five thousand; six hundred ninety-three million one hundred thousand eighty-three; five hundred one million eighty thousand two hundred seventy-six.

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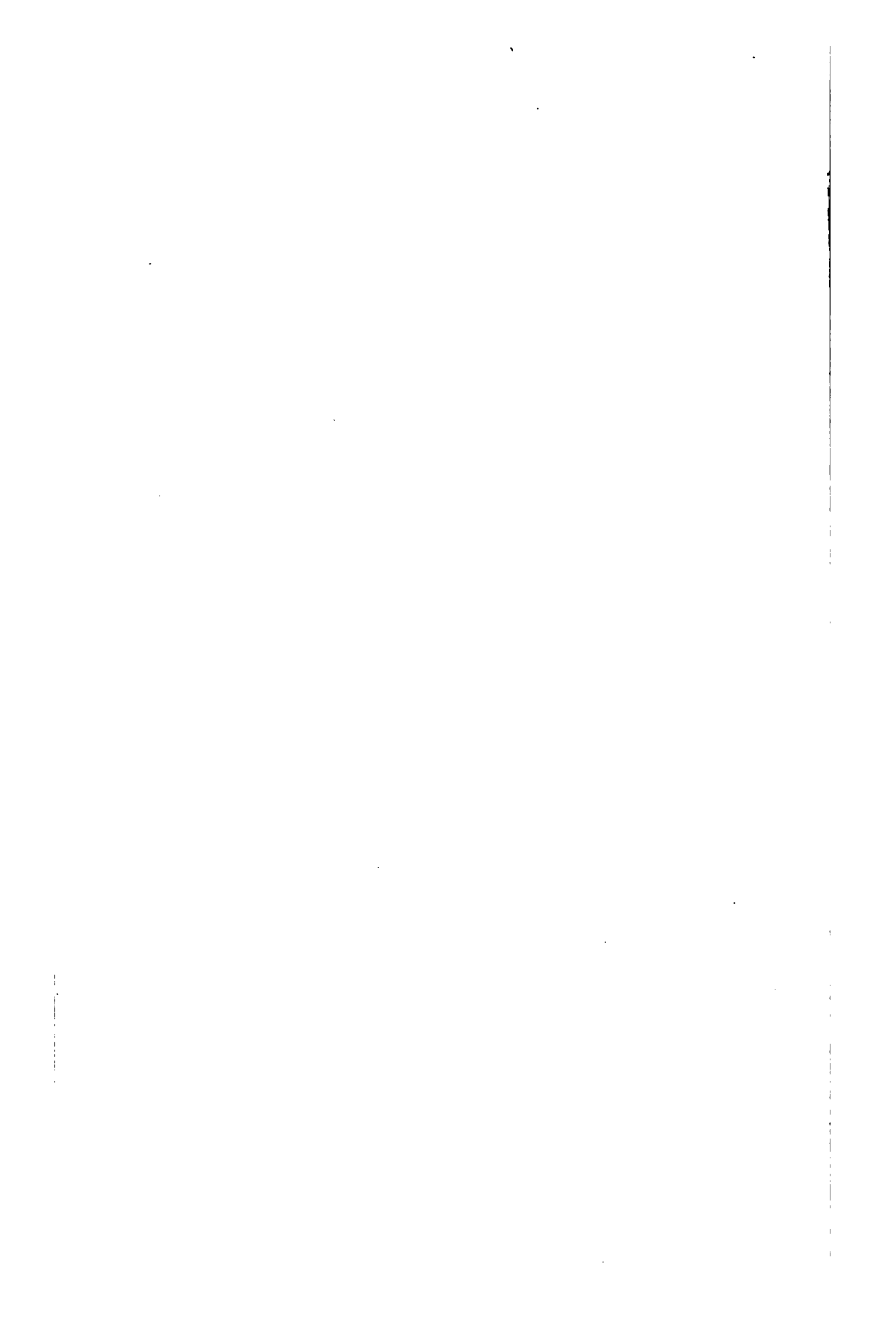
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	65.	
	Ⓐ	B
1,754 pounds.	1,249 pounds.	2,154 pounds.
967 "	856 "	1,182 "
<hr/> 787 pounds.	<hr/> 393 pounds.	<hr/> 972 pounds.
C	W. I.	N. O.
1,864 pounds.	2,752 pounds.	1,954 pounds.
1,892 "	2,158 "	369 "
<hr/> 172 pounds.	<hr/> 594 pounds.	<hr/> 1,585 pounds.

## SECTION V.

## M U L T I P L I C A T I O N .

## C A S E I.

## The Multiplier One Figure.

- |                    |                    |                   |
|--------------------|--------------------|-------------------|
| 1. 172.            | 2. 792.            | 3. 2,455.         |
| 4. 43,701.         | 5. 108,496 pounds. | 6. \$156.         |
| 7. \$210.          | 8. 1,715 pounds.   | 9. \$126.         |
| 10. 278 miles.     | 11. \$624.         | 12. \$14,136.     |
| 13. 7,728 men.     | 14. \$260.         | 15. 71,776 cents. |
| 16. \$666.         | 17. 80 windows.    | 18. 63 pillars.   |
| 19. 54 windows.    | 20. 144 cents.     | 21. 712 cents.    |
| 22. \$42.          | 23. 210 cents.     | 24. 154 miles.    |
| 25. \$46,187.      | 26. 14,080 yards.  | 27. 42,240 feet.  |
| 28. 65,275 bricks. | 29. \$304,875.     |                   |

## C A S E II.

## The Multiplier any number of tens, hundreds, thousands, and so on.

- |                  |                     |                |
|------------------|---------------------|----------------|
| 30. 650 bushels. | 31. 19,600 pounds.  | 32. \$240,000. |
| 33. 23,947,000.  | 34. 17,594,100,000. | 35. \$2,500.   |
| 36. \$8,800.     | 37. \$1,980.        | 38. \$33,500.  |
| 39. \$35,640.    | 40. \$71,100.       | 41. \$56,000.  |
| 42. 198,000.     | 43. 1,636,050,000.  |                |

CASE III.

The Multiplier more than One Figure.

44. 782.	45. 3,285.	46. 15,174.
47. 241,056.	48. 82,487,324.	49. 12,848 bushels.
50. 1,548 men.	51. 391 miles.	52. \$3,003.
53. \$4,875.	54. \$58,500.	55. \$1,909.
56. \$50,760.	57. \$805,175.	58. 57,592 reams.
59. 1,181,292.	60. 11,702,718.	61. 242,447,233.

CASE IV.

One or more Ciphers between other Figures of the Multiplier.

62. 86,478.	63. 874,368.	64. 3,845,355.
65. 149,598,976.	66. \$109,515.	67. \$41,445.
68. \$1,836.	69. \$77,749.	70. 428,572 yards.
71. 14,007 yards.	72. 4,814,156 yards.	

CASE V.

One or more Ciphers on the Right of either or both Factors.

73. 7,400 pounds.	74. \$8,550.	75. 3,510 bushels.
76. 80,000 sheets.	77. 43,240 pounds.	78. 43,680 axes.
79. \$125,000.	80. 124,800 sheets.	81. 37,400 barrels.
82. \$850,000.	83. 40,280,000,000.	84. 29,349,800,000.

---

85. 1,344 acres.	86. 756 wagons.	87. 5,248 poles.
88. 9,316 words.	89. \$8,773,650.	90. 136,300 pounds.
91. 32,584,960 acres.	92. 41,911,980 ems.	93. 3,895,500,000.
94. 89,420 miles.	95. 1,858,784,716,800 cubic feet.	
	96. 94,185 yards.	

97.

 $\$13 \times 12 = \$156$ , wages of 1 man for 12 months; and $\$156 \times 896 = \$139,776$ , wages of 896 men for 12 months.

98.

 $\$5 \times 12 = \$60$ , for 12 pairs, or 1 case; and $\$60 \times 27 = \$1,620$  for 27 cases.

99.

27 yards  $\times$  48 = 1,296 yards woven on 48 looms daily.1,296 yards  $\times$  208 = 269,568 " " " " " in 208 days.

100. 4,480,000 rounds.

## C A S E V I.

## Powers.

101.  $9 \times 9 = 81$ .

102.  $5 \times 5 \times 5 = 125$ .

103.  $423 \times 423 = 178,929$ .  $47 \times 47 \times 47 = 103,823$ .

104.  $12 \times 12 \times 12 \times 12 = 20,736$ .

105.  $52^3 = 140,608$ .  $901^3 = 731,432,701$ .

106.  $2,016^2 = 4,064,256$ .

107.  $218^5 = 107,834,407,098,824$ .

108.  $63^7 = 3,938,980,639,167$ .

109.  $14^8 = 1,475,789,056$ .

110.  $139^2 = 19,321$ ;  $97^2 = 9,409$ ;  $26^4 = 456,976$ ;

$18^5 = 1,889,568$ ;  $11^6 = 1,771,561$ .

# SECTION VI.

## *D I V I S I O N.*

### CASE I.

#### The Divisor One Figure.

##### FIRST METHOD.

1. 324.	2. 121.	3. 39 tons.
4. 1,232.	5. \$132.	6. 312 suits.
7. \$532.	8. 182 car loads.	9. 393 barrels.
10. 2,649 bricks.	11. \$295.	12. 216 wagons.

##### SECOND METHOD.

13. \$4,688.	14. 297 days.	15. \$9,931.
16. 729 bagfuls.	17. 675 pounds.	18. 69 weeks.
19. 23 weeks.	20. 12 quarts.	21. 16 weeks.
22. 173 acres.	23. 4,124 bushels.	24. 735 thousand.
25. \$813.	26. 127 hours.	27. 948 barrels.
	28. \$134.	

### CASE II.

#### The Divisor more than One Figure.

29. \$24.	30. 32 miles.	31. 45 bushels.
32. \$63.	33. \$27.	34. 114.
35. \$4.	36. 184 tubs.	37. \$18.
38. 18 sheets.	39. 8 cars.	40. \$48,396.
41. 15 years.	42. 17 hours.	43. \$134.
44. 16,725 bushels.	45. \$105.	46. 209 days.
47. \$1,005.	48. 702 casks.	49. 204,007.
	50. 90,003.	51. 70,056.

## C A S E I I I .

**Remainders after Dividing last Partial Dividend.**

52. 9 payments of \$350, and 1 payment of \$250.  
 53. 23 casks, and 19 gallons over.  
 54. 215 times, with a remainder of 123.  
 55. 18 boat-loads, and 92 barrels over.  
 56. 17 cars, and leave a surplus of \$125.  
 57. Quotient, 109; remainder, 219.  
 58. 212 bales, and 48 pounds left.  
 59. Quotient, 591; remainder, 953.  
 60. Quotient, 508; remainder, 525.  
 61. Quotient, 5,049; remainder, 1,273.

## C A S E I V .

**The Divisor any Number of Tens, Hundreds, Thousands,  
and so on.**

62. \$65.                      63. 473 centals.                      64. 225 shares.  
 65. 3 steam-tugs.                      66. 192 thousand.                      67. 6 carriages.  
 68. 3,934.                      69. 876 horses.                      70. 8 head, and have \$3 left.  
 71. 582 full cars, and 1 car carrying 93 barrels.  
 72. 6 payments of \$25,000 each, and 1 of \$15,875.  
 73. Quotient, 5; remainder, 13,285.  
 74. Quotient, 734; remainder, 14,000.

- 
75. 17,285 barrels.                      76. \$180.                      77. \$145,690.  
 78. 144 hills.                      79. 18 hills.                      80. \$165.  
 81. 27 cows, and \$30 remaining.                      82. 78 houses.  
 83. 48 reapers.                      84. 239 barrels, with 75 pounds of pork left.  
 85. 43 chests.                      86. 34 canal-boats.                      87. 59 pupils.  
 88. 15,080 quires.                      89. 754 reams.                      90. \$140.

91. 90,804.                      92. Quotient, 673,000; remainder, 723.  
 93. Quotient, 49,278; remainder, 9,493.    94. 387 pounds.  
 95. 76 miles.                      96. \$852.                      97. 96 days.

98.

Wheat, 417 bushels  $\div$  72 bushels = (5 times =) 5 bins, and  
 57 bushels of wheat left.

Oats, 873 bushels  $\div$  72 bushels = (12 times =) 12 bins, and  
 9 bushels of oats left.

Barley, 314 bushels  $\div$  72 bushels = (4 times =) 4 bins, and  
 26 bushels of barley left.

99.

417 bushels + 873 bushels + 314 bushels = 1,604 bushels; and  
 1,604 bushels  $\div$  72 bushels = (22 times =) 22 bins, with  
 a remainder of 20 bushels.

100.

113 acres at \$54, \$6,102  
 Paid down,                      1,392

Balance, \$4,710

\$4,710  $\div$  6 = \$785, yearly payment.

## SECTION VII.

### REVIEW PROBLEMS IN INTEGERS.

1. 33,875.                      2. 44,766.                      3. 751, 991.  
 4. \$7,650 - (\$2,225 + \$1,750 + \$1,875) = \$1,800.  
 5. 797,863,214.                      6. 9,331,200,000.                      7. 96.  
 8. 72.                      9. He made \$385.                      10. 22 tons.

11.

In 1 day 1 man can lay 1,950 bricks.

" 67 days 1 " " "  $67 \times 1,950$  bricks = 130,650 bricks; and

" 67 " 7 men " "  $7 \times 130,650$  bricks = 914,550 bricks.

12. 19,487 gallons - 13,294 gallons + 7,483 gallons = 13,626  
 gallons.



13.

Live weight, 1,816 lb.  
 Dressed weight,  $(271 + 264 + 275 + 287 + 85 + 97 =)$  1,279 "  
 Difference, 537 lb.

14.

$\$3,875 + \$6,820 + \$1,280 + \$7,896 + \$875 = \$20,746$ , receipts.  
 $\$3,176 + \$5,194 + \$1,342 + \$6,950 + \$788 = 17,450$ , cost.  
 \$3,296, profits.

15. \$206.

16. \$17,155.

17.

153 acres @ \$95 = \$14,535  
 Paid down, 2,500  
 Unpaid, \$12,035

18.

$2 \times \$7,600 = \$15,200$  to 2 sons.  
 1,500 " a third son.  
 $3 \times \$3,775 = 11,325$  " 3 daughters.  
 6,877 " other parties.

\$34,902, the estate.

$\$34,902 \div 6 = \$5,817$ , each child received.

19.

56 yards @ \$6 = \$336, selling price.  
 266, cost.  
 \$70, profit.

20.

In 1 day the mill will grind  $9 \times 100$  bushels = 900 bushels; and  
 $297,000 \text{ bushels} \div 900 \text{ bushels} = 330 \text{ times} = 330 \text{ days}$ .

21.

The fodder will last 1 cow  $35 \times 4 = 140$  months;  
 $35 \text{ cows} - 7 \text{ cows} = 28 \text{ cows remaining}$ ; and  
 $140 \text{ months} \div 28 = 5 \text{ months}$ .

22. Balanced.

23.

$\$ 6,500 + 9 \times \$6,000 = \$80,500$ , amount in 1 year.  
 $\$60,500 \times 4 = \$242,000$ , amount in 4 years.

24. 37 companies, with 49 recruits left. 25. \$763.

26.

He raised		984 bushels.
" saved for seed,	48 bushels.	
" " " 5 horses,	<u>250</u>	298 "

He sold 686 bushels.

27.

	Cash, \$100
Cost of furs,	<u>\$58</u>
" " 17 yards silk @ \$2,	34 92
	She had left, \$8

28. 24 sacks.

29.

5 hogsheads of 140 gallons each = 700 gallons; and  
700 gallons — (17 + 5 + 9 + 4 + 2) gallons = 663 gallons.

30.

	Bounty, \$949
Wages for 8 months @ \$13	<u>104</u>
" " 8 " " 14	112
" " 13 " " 17	221
" " 7 " " 18	<u>126</u>

Time, 36 months; total amount, \$1,512

$\$1,512 \div 36 = \$42$  per month.

31. 59 states, and 149 square miles remainder.

32. 35 states, and 70,000 square miles remainder.

33. 6 times, and 36,832 square miles remainder.

34. 4,483 square miles.

35. 45 times as large as New England; the remainder is  
8,460 square miles larger than Tennessee.

36. 54 states; 20,123 square miles.

37. 68,202 square miles smaller than the U. S.

38. Each state would be 30,036 square miles larger than  
Ohio.

39. It is 2,973 square miles less.

40. Into 11, and 154,741 square miles remainder.

# CHAPTER II.

## DECIMALS.

### SECTION II.

#### *NOTATION AND NUMERATION.*

##### *EXERCISES.*

1. Four tenths, eight tenths, one tenth, seven and three tenths, ten and nine tenths, three hundred ninety-two and six tenths, seven thousand one hundred ninety-eight and two tenths.

2. .5; .1; .9.

3. 17.8; 28.6.

4. 240.9; 1006.5.

5. .2; 560.4.

6. 43 hundredths, 91 hundredths, 4 hundredths, 8 and 32 hundredths, 5 and 9 hundredths, 47 and 47 hundredths, 5,080 and 6 hundredths.

7. .03; .51; 2.75.

8. 15.15; 328.11.

9. 30.30; 200.02.

10. 43 hundredths, 18 hundredths, 2 hundredths, 6 and 27 hundredths, 342 and 51 hundredths, 99 and 7 hundredths.

11. 176 thousandths, 584 thousandths, 96 thousandths, 204 thousandths, 7 thousandths, 901 thousandths.

12. 4 and 23 hundredths, 19 and 7 hundredths, 70 and 219 thousandths, 9 and 21 thousandths, 317 and 108 thousandths, 11 and 5 thousandths.

13. .56.

14. .93; .06.

15. .197.

16. .211; .042.

17. .307.

18. 30.19.

19. 256.04.

20. 193.005.

21. 3281.059.

22. 10000.208.

23. One thousand seven hundred sixty-five ten-thousandths, three thousand forty-six ten-thousandths, ninety-two and one thousand five ten-thousandths, one hundred and forty-eight ten-thousandths.

24. 39,417 hundred-thousandths; 9 hundred-thousandths; 53 and 40,206 hundred-thousandths; 10 and 538 hundred-thousandths.

25. 476,398 millionths; 11 and 141 millionths; 904 and 204,080 millionths; 21 and 600,008 millionths.

26. 4,598,217 ten-millionths; 19 and 3,006,009 ten-millionths; 214 and 380,965 ten-millionths.

27. 1 hundred-millionth; 70,876,941 hundred-millionths; 329,000 and 80,000,185 hundred-millionths.

28. 3,976 and 70,009 millionths; 56 and 85 ten-thousandths; 10,006 and 596 millionths.

29. 5 and 5,682 ten-thousandths; 273 and 8,760,099 ten-millionths; 1 and 7 billionths.

30. .0291; .706095.

31. .000508; .00000217.

32. .90085765.

33. .0000005; .0000000018.

34. 3750.0017.

35. 7000.007.

36. 2548006.000905.

37. 19.000000019.

38. .000297641879; .0000700849.

39. .000617.

40. 600.000017.

41. .04007.

42. 4000.00007.

43. 4000.700.

44. .0809157.

45. .063354877.

46. 1400.010.

---

## SECTION III.

### A D D I T I O N .

1. 2.309.

2. 2.5534.

3. 1217.43.

4. 4126.8174.

5. .0420475.

6. 2.4875 cords

7.

8.

9.

6.75 miles.

9.5 acres.

16.25 yards.

4.6 "

11.4 "

12.75 "

7.384 "

8.75 "

6.5 "

2.14 "

12.675 "

11.875 "

20.874 miles.

42.325 acres.

23.5 "

70.875 yards.

10. 61.7695 tons.    11. 18.43 ounces.    12. 125 acres.  
 13. 22.199 inches.    14. \$995.15.    15. 737.1925 gallons.  
 16. 2,460 and 40,072 hundred-thousandths.

## SECTION IV.

*SUBTRACTION.*

1. .1784.                      2. 335.4818.                      3. 15.5328.  
 4.                                  5.                                  6.  
 2940.                              43.75 yards.                      17.5 miles.  
   .0492                              19.25 "                              9.875 "  
                                                                                            
 2939.9508                              24.5 yards.                              7.625 miles.  
 7. 34.75 tons.                      8. 46.375 bushels.    9. .6875 of the vessel.  
 10. 127.6875 barrels.    11. \$11.875.                      12. .975 of a ton.  
                                  13. \$349.75.  
 14. 1200 miles—(276.5 miles + 318.37 miles + 294.2 miles)  
 = 310.93 miles.  
 15. 400 tons—(93.4 tons + 56.81 tons + 211.7 tons) = 38.09  
 tons.  
 16. (296.5 acres + 145.75 acres + 96 acres)—(72.5 acres +  
 86 acres + 105.25 acres + 105.25 acres) = 169.25 acres.

## SECTION V.

*MULTIPLICATION.*

1. 504 gallons.                      2. 96.2 tons.                      3. 33.25 bushels.  
                                  4.                                      5.                                      6.  
                                  33.125 miles.                                      14.6                                      27.31  
                                  27                                      2.7                                      4.5  
                                                                                                                                                                                    
                                  231875                                      1022                                      13655  
                                  66250                                      292                                      10924  
                                                                                                                                                                                    
                                  2394.375 miles.                                      39.42                                      122.895

- |                                     |                          |                    |
|-------------------------------------|--------------------------|--------------------|
| 7. 78219.48.                        | 8. \$10484.375.          | 9. 23234.375 tons. |
| 10. \$81.6508.                      | 11. 12.342 miles.        | 12. \$4503.125.    |
| 13. Copper, .7 ton; zinc, .175 ton. | 14. .25 of it.           |                    |
| 15. 3964.5 feet.                    | 16. \$1663.8.            | 17. 10.098 miles.  |
| 18. 5.99795 ounces.                 | 19. 11.144609245 ounces. | 20. 48.59.         |
| 21. .3404.                          | 22. .00022698.           | 23. .0000124608.   |
| 24. .03.                            | 25. 9.65625 pounds.      |                    |

26.

In 1 day 1 man can mow 1.875 acres.  
 " 1 " 18 men " "  $18 \times 1.875$  acres = 24.875 acres.  
 " 7.5 days 18 " "  $7.5 \times 24.875$  " = 182.8125 "

27.

I made 325 gallons.  
 I sold 9 barrels of 31.5 gallons each = 283.5 "  
 I had left 41.5 gallons.

28.

7 pieces of 43.75 yards each	= 306.25 yards.
4 " " 46.5 " "	= 186 "
3 " " 39.5 " "	= 118.5 "
1 piece,	24.375 "
1 "	<u>19.675 "</u>
Total, 654.8 yards.	

29.

13.5 acres yielded 23 bushels each	= 310.5 bushels.
9 " " 30.25 " "	= 272.25 "
11.75 " " 24.44 " "	<u>= 287.17 "</u>
Total yield, 869.92 bushels.	

30.

In 1 week 11 horses at  $11 \times 2.625$  bushels = 28.875 bushels.  
 " 19 weeks 11 " "  $19 \times 28.875$  " = 548.625 "

## SECTION VI.

*D I V I S I O N .*

$$\begin{array}{r} 1. \\ \underline{280.5} \text{ acres. } \{ 3 \\ 93.5 \text{ acres.} \end{array}$$

$$\begin{array}{r} 2. \\ \underline{\$157.5} \{ \$9 \\ 17.5 \text{ times} = 17.5 \text{ weeks.} \end{array}$$

$$\begin{array}{r} 3. \\ \underline{118} \text{ rods. } \{ 8 \text{ rods.} \\ 14.75 \text{ times} = 14.75 \text{ days.} \end{array}$$

- |                                  |                  |                   |
|----------------------------------|------------------|-------------------|
| 4. 6.5 bushels.                  | 5. 84.98.        | 6. 901.125 times. |
| 7. 4.4 times, and 2.7 remaining. |                  | 8. .0053.         |
| 9. 1.875 ounces.                 | 10. 7.25 sheets. | 11. 2.32 yards.   |
| 12. 4 dress patterns.            | 13. 23 lengtha.  | 14. 84.           |
| 15. 53.125.                      | 16. 4.           | 17. .025.         |
| 18. 273.                         | 19. 8.5 cords.   | 20. 141.6 tons.   |
| 21. 24.75 days.                  | 22. 2.4 inches.  |                   |

## 23.

$$\begin{array}{l} 116.55 \text{ acres} \div 7 = 16.65 \text{ acres, 1 man cradles in 4.5 days.} \\ 16.65 \text{ " } \div 4.5 = 3.7 \text{ " } 1 \text{ " " " 1 day.} \end{array}$$

## 24.

$$\begin{array}{l} 3074.5 \text{ days} \div 13 = 236.5 \text{ days, average weekly attendance.} \\ 236.5 \text{ " } \div 5.5 = 43 \text{ " " daily " } \end{array}$$

25. Into 13 building lots, and .125 of an acre left.  
 26. 523 casks, and have 12.5 gallons left.  
 27. 50.5 tons more than 19 boat-loads.  
 28. 37 loads, and .125 of a cord more.  
 29. 56 kettles, and 200 pounds of iron remaining.

## SECTION VII.

## UNITED STATES MONEY.

1.	2.	3.
Grammar, \$.875		\$9.935 Incometax, \$34.26
Slate, .25	Four	9.625 State " 42.11
Reader, .75	Quarters,	8.11 Village " 18.04
Writing-book, .125		8.00 School " 7.65
\$2.00	Hide,	6.89 Road " .62½
	Tallow,	8.92 Military " 1.00
	Amount,	\$51.48 Taxes, \$108.68½
4. \$657.435.	5. \$24.12½.	6. \$10.68½.
		7. \$80.42

---

8. \$240.58.

9.	10.	11.
\$598.625	\$1132.653	\$251
496.54	96	8.875
\$ 97.085	\$1036.658	\$242.625
12. \$1,573.144.	13. \$50.50.	14. \$7.33.
	15. \$140.87½.	16. \$287.785.

17.	18.	19.
\$21.25	\$2.4375	\$6.80
46	.215	12.5
12750	121875	840
8500	24375	136
\$977.50	48750	68
	\$5240625	\$85.000
20. \$52.03½.	21. \$9.	22. \$36.
23. \$8.62½.	24. \$267.30.	25. \$9.18½.
26. \$1.73½.	27. \$315.18½.	28. \$10.95.
	29. \$3,996.75.	



30.		31.		
\$19.9375	\$ .0625	\$5.25	14	32. \$15.75.
1875	319 times.	42	\$ .375	33. 1,760.
1187	Hence, 319 pounds.	105		34. \$1.12½.
625		98		35. \$56¼.
5625		70		36. \$6.15.
5625		70		37. \$.04.

38. 65.5 bushels.

39.		
He received		\$8,725
The materials cost	\$1,641.0625	
" labor	1,296.50	2,937.5625
He made		\$787.43¾

40.	
Span of horses,	\$310
Horse, \$187.50	
Watch, 64.875	252.375
Balance, \$	57.625

41.		
Sales.		Purchases.
Pork, \$57.625		Coat, \$13.50
Poultry, 4.1875		Groceries, 4.48
Receipts, \$61.8125		Hardware, 29.74
Disbursements, 47.72		Disbursements, \$47.72
Balance, \$14.09½		

42.	
84 acres @ \$75,	\$6,300
Cash payment, 1,750	
He ran in debt,	\$4,550

43.	
156 pounds @ \$.08½,	\$12.87.
\$12.87 ÷ \$.055 =	234 times = 234 pounds.

44.	
365 days — 52 Sundays =	313 days.
\$50,000 ÷ 313 =	\$159.74.

45.

$$\$376.75 + \$31.18\frac{1}{2} + \$103.12\frac{1}{2} = \$511.06.$$

46.

$$7 \times 31.5 \text{ gallons, @ } \$1.37\frac{1}{2} = \$303.18\frac{1}{2}.$$

$$47. \$29.70\frac{1}{2}.$$

$$48. 714.51.$$

49.

7 tenements, @	\$1.12 $\frac{1}{2}$ ,	\$ 7.87 $\frac{1}{2}$
5       "       "	1.25,	6.25
11       "       "	1.50,	16.50

Amount of rents for 1 week, \$30.62 $\frac{1}{2}$

$$\text{" " " " 1 year, } 52 \times \$30.625 = \$1,592.50.$$

50.

$$236 \text{ pounds} + 249 \text{ pounds} + 261 \text{ pounds} = 746 \text{ pounds; and}$$

$$746 \text{ pounds @ } \$0.095 = \$70.87.$$

51.

If 5 tons are equal to 9 cords, 1 ton is equal to one fifth of 9 cords, or 1.8 cords.

$$31.5 \text{ cords} \div 1.8 \text{ cords} = 17.5 \text{ times} = 17.5 \text{ tons.}$$

$$31.5 \text{ cords @ } \$4.25 = \$133.87\frac{1}{2}$$

$$17.5 \text{ tons " } 6.80 = 119$$

$$\$ 14.87\frac{1}{2} \text{ saved in 1 year.}$$

52.

$$117 \text{ words} - 25 \text{ words} = 92 \text{ words.}$$

$$\text{First 25 words, } \$ .50$$

$$92 \text{ words @ } \$0.05, \quad 4.60$$

$$\text{Cost of telegram, } \$5.10$$

53.

$$\text{He bought } 3 \times 80 \text{ acres} + 40 \text{ acres} = 280 \text{ acres.}$$

$$280 \text{ acres} \div 2 = 140 \text{ acres} = \text{one half the land.}$$

$$140 \text{ acres @ } 3 \times \$1.25 = \$525$$

$$140 \text{ " " } 4 \times 1.25 = 700$$

$$\text{He sold the land for } \$1,225$$

54.

$$17 \times 2,000 \text{ pounds} = 34,000 \text{ pounds, in 17 tons.}$$

$$34,000 \text{ pounds @ } \$0.145 = \$4,930.$$

## SECTION VIII.

*MEASUREMENT OF RIGHT-ANGLED  
SURFACES AND SOLIDS.*

## CASE I.

## Measurement of Surface.

1. 19 square feet  $\times 5 = 95$  square feet.
2. 8 square rods  $\times 6 = 48$  square rods.
3.  $12 \times 8.5$  square inches = 102 square inches.
4.  $11.5 \times 5.5$  square yards = 63.25 square yards.
5.  $9 \times 14$  square inches = 126 square inches.
6.  $2.75 \times 8.5$  square yards = 23.375 square yards; and  
23.375 square yards @  $\$1.12\frac{1}{2} = \$26.30$ .
7.  $75 \times 125.3$  square feet = 9397.5 square feet.
8.  $5.5 \times 5.5$  square rods = 30.25 square rods.
9. 2,604 square inches  $\div 31$  square inches = 84 times =  
84 inches.
10. 19,200 square rods  $\div 80$  square rods = 240 times =  
240 rods.
11. 288 square feet  $\div 18$  square feet = 16 times = 16 feet.
12. 3,375 square feet  $\div 45$  square feet = 75 times = 75 feet.
13. 16,875 plants  $\div 75 = 225$  plants.

## CASE II.

## Measurement of Capacity.

14. 9 bricks  $\times 8 \times 7 = 504$  bricks.
15. 7 cubic inches  $\times 6 \times 4 = 168$  cubic inches.
16. 6,000 cubic feet  $\div (12 \times 4 =) 48$  cubic feet = 125 times  
= 125 feet.
17. 8 cubic feet  $\times 4 \times 4 = 128$  cubic feet.
18. 35 cubic feet  $\times 2 \times 1.5 = 105$  cubic feet.

19.  $1,280 \text{ cubic feet} \div (4 \times 5) = 20 \text{ cubic feet} = 64 \text{ times}$   
 $= 64 \text{ feet.}$

20.

$27 \text{ cubic feet} \times 24 \times 7 = 4536 \text{ cubic feet; and}$   
 $4,536 \text{ cubic feet} \div 27 \text{ cubic feet} = 168 \text{ times} = 168$   
 $\text{cubic yards.}$

21.  $22.5 \text{ cubic feet} \times 6.4 \times 3.25 = 468 \text{ cubic feet.}$

22.

$21323.1 \text{ cubic inches} \div (18.5 \times 28.25) = 522.625 \text{ cubic inches}$   
 $= 40.8 \text{ times} = 40.8 \text{ inches, length of melodeon.}$

$40.8 \text{ inches} + 2 \text{ inches} = 42.8 \text{ inches, length of box;}$

$18.5 \text{ " } + 2 \text{ " } = 20.5 \text{ " width " "}$

$28.25 \text{ " } + 2 \text{ " } = 30.25 \text{ " height " "}$

23.  $7 \times 8 \times 2.25 \text{ cubic feet} = 47.25 \text{ cubic feet.}$

24.

$2 \times 45 \text{ feet} = 90 \text{ feet, length of two side walls.}$

$2 \times (24 - 2) = 22 \text{ " } = 44 \text{ " " " " end "}$

$194 \text{ " " " all the "}$

$36 \times 194 \text{ cubic feet} = 4,824 \text{ cubic feet of masonry.}$

25.  $12 \times 12 \times 12 \text{ cubic inches} = 1,728 \text{ cubic inches.}$

26.  $5.5 \times 5.5 \times 5.5 \text{ cubic yards} = 166.375 \text{ cubic yards.}$

27.  $196.8 \text{ cubic feet} \div (12.3 \times 4) = 49.2 \text{ cubic feet} = 4$   
 $\text{times} = 4 \text{ feet.}$

## SECTION IX.

### REVIEW PROBLEMS IN DECIMALS.

1.

$87 \times 56 \text{ days} = 2,072 \text{ days.}$

$13 \times 84 \text{ " } = 1,092 \text{ "}$

$12 \times 43 \text{ " } = 516 \text{ "}$

$17 \times 21 \text{ " } = 357 \text{ "}$

$\text{Total time, } 4,087 \text{ days.}$

$4.087 \times \$8.75 = \$3,582.37\frac{1}{2}, \text{ amount of wages.}$

2.

4 barrels of 31.5 gallons each = 126 gallons.

 $\$55.125 \div 126 = \$4375$ , cost per gallon $\underline{.1875}$ , gain " " $\$.625$ , selling price per gallon.3.  $\$66.9375 \div \$7.875 = 8.5$  times = 8.5 bushels.

4.

 $45 \times 200$  pounds = 9,000 pounds. $25$  pounds +  $12.5$  pounds =  $37.5$  pounds, to fill a kit of each size; $9,000$  pounds  $\div 37.5$  pounds =  $240$  times =  $240$  kits of each size; and $2 \times 240$  kits =  $480$  kits.

5.

 $950$  bushels  $\div 67.5$  bushels =  $14$  times =  $14$  horses, with  $5$  bushels remaining.

6.

 $1354$  gallons —  $1010.8$  gallons =  $343.2$  gallons, gain in 1 hour. $23381$  gallons —  $12999.2$  gallons =  $10381.8$  gallons to run in. $10381.8$  gallons  $\div 343.2$  gallons =  $30.25$  times =  $30.25$  hours.

7.

Single subscribers, 694 copies.

63 clubs of 3 = 189 "

47 " " 5 = 235 "

34 " " 10 = 340 "

Free list, 50 "

Total circulation, 1,508 copies.

694 single subscribers @  $\$1.50$ ,  $\$1,041$ 63 clubs of three "  $3.75$ , 236.2547 " " five "  $5.00$ , 23534 " " ten "  $8.75$ , 297.50Receipts from subscriptions,  $\$1,809.75$ 8.  $.56$  of a ton  $\times 736.72 = 412.5632$  tons.

9.

69 beeves @	\$28.75	\$1,983.75, cost.
42 " "	36.50, \$1,533	
27 " "	37.75, <u>1,019.25</u>	2,552.25, receipts.
		\$ 568.50, gain.

10.

In 1 day they are 23.16 miles + 19.21 miles = 42.37 miles apart; and

In 17.4 days they are  $17.4 \times 42.37$  miles = 737.238 miles apart.

11.

2 pupils at 1 desk;

$7 \times 2$  pupils = 14 pupils in 1 row;

$8 \times 14$  pupils = 112 pupils in school-room.

12.

16.25 square inches  $\times$  25.2 = 409.5 square inches.

409.5 square inches @ \$.03 = \$12.28 $\frac{1}{2}$ .

13.

\$182, cost, + \$70, gain, = \$252, selling price; and

$\$252 \div \$4.50 = 56$  times = 56 cords.

14.  $\$41.79 \div \$0.105 = 398$  times = \$398, the sum borrowed.

15. 6 square miles  $\times$  6 = 36 square miles.

16.

2805 square feet  $\div$  8.5 square feet = 330 times = 330 feet, length of fence.

330 feet  $\div$  4 = 82.5 feet, length of one side of garden.

17.

536 bushels oats @	\$ .625,	\$335
319 " wheat "	2.125,	677.875
114 " barley "	1.375,	156.75
443 " corn "	1.125,	<u>498.375</u>

Total receipts, \$1,668

18.

Length of four walls, 18 feet + 18 feet + 13.25 feet  $\times$  13.25 feet = 62.5 feet.

62.5 square feet  $\times$  9.5 = 593.75 square feet.

19.

Publisher's expenses, \$515 + \$365 + \$370 + \$80 = \$1,330;

\$1,330 ÷ 2,000 = \$.665, cost of 1 copy;

Author's copy-right, .08

Publisher's profit, .205

Bookseller's " .30

Retail price, \$1.25 per copy.

20.

.006119

408.026

2020200.0703

.00030065

2020608.10271965

21. 1744.46605 miles.

22. \$65.32.

23. 167.73 tons.

24.

23.75 miles — 19.5 miles = 4.25 miles apart in 1 day; and

64.6 miles ÷ 4.25 miles = 15.2 times; hence, 15.2 days.

25.

23.75 miles + 19.5 miles = 43.25 miles apart in 1 day; and

43.25 miles × 15.2 = 657.4 miles.

26.

Farmer's sales.

37.25 pounds butter @ \$.27, \$10.0575

21.5 dozen eggs " .19, 4.085 \$14.1425

Merchant's sales.

12 yards shirting @ \$.25, \$3.00

13.5 " calico " .28, 3.78 6.78

The merchant paid \$7.36½

27.

(3.5 × 5 × 8 =) 140 cubic inches, contents of 1 ream.

(14 × 20 × 32 =) 8,960 " " " " box.

8,960 cubic inches ÷ 140 cubic inches = 64 times = 64 reams.

# CHAPTER III.

## COMPOUND NUMBERS.

### SECTION II.

#### *NOTATION AND REDUCTIONS.*

1.	2.	3.
£32	\$249 43 cents.	\$93 4 s. 17 cts.
<u>20</u>	<u>100</u>	<u>5</u>
640 s.	24,943 cents.	469 s.
<u>12</u>	<u>10</u>	<u>20</u>
7,680 d.	249,430 mills.	9,397 cts.

4. £45 8 s. 6 d. = 43,608 qr.  
 5. £11 10 s. = 230 s. Hence, 230 yards.  
 6. 9 s. 7.25 d. = 461 qr.  
 8. 15 gal. = 480 gi.  
 9. 27 gal. 3 qt. 2 gi. = 890 gi.  
 10. 87 gal. 1.5 qt. = 699 pt. Hence, 699 bottles.  
 11. 18 bu. = 576 qt.  
 12. 6.375 bu. = 204 qt.  
 13. 2 bu. 4 qt. = 136 pt. Hence, 136 papers.  
 15. 7 bu. 3 pk. 7 qt. = 255 qt. Hence, 255 baskets.  
 16. £6.5 = 1,560 d.  
 17. 13 bu. 3 pk. 6 qt. = 446 qt.

18.	19.
256,327 mills.   10 mills.	1680 d.   12 d.
25632 cts. 7 mills.   100 cts.	140 s.   20 s.
\$256 32 cts.	£7
Hence, 256,327 mills =	Hence, 1,680 d. = £7.
\$256 32 cts. 7 mills.	

20. 765 bu. @ 1 s. = 765 s. = £38 5 s.  
 21. 486 pt. = 60.75 gal., or 60 gal. 3 qt.  
 22. 1,024 gi. = 32 gal. Hence, 32 times.  
 23. 733 pt. = 11 bu. 1 pk. 6 qt. 1 pt.  
 24. 7,280 qt. = 227.5 bu., or 227 bu. 2 pk.



26. 500 gi. = 15.625 gal., or 15 gal. 2 qt. 1 pt.

27. 187 qt. = 5 bu. 3 pk. 3 qt.

28.  $892 \times 1$  pt. = 892 pt. = 111 gal. 2 qt.

29. 5 gal. 3 qt. = 23 qt. = 23 cupfuls.

30. 4,879 qr. = £5 1 s. 7.75 d.

31. 10 qt. = 80 gi., or 2 gal. 2 qt.

32. 167,824 qr. = £174 16 s. 4 d.

## 33.

1st Solution.—7.5 gal. = 30 qt., and  $30 \text{ qt.} \div 2 \text{ qt.} = 15$  times.

2d Solution.—2 qt. = .5 gal., and  $7.5 \text{ gal.} \div .5 \text{ gal.} = 15$  times.

3d Solution.— $\begin{cases} 1 \text{ gal. will fill the 2-qt. measure 2 times;} \\ \text{and } 7.5 \times 2 \text{ times} = 15 \text{ times.} \end{cases}$

4th Solution.— $\begin{cases} 2 \text{ qt. are 1 half-gal., 7.5 gal. are } 7\frac{1}{2} \text{ gal. or 15} \\ \text{half-gal., and 1 half-gal. is contained in 15} \\ \text{half-gal. 15 times.} \end{cases}$

34. .6875 gal. = 22 gi..

## 35.

6784.8 d.  $\div$  12 d.

565 s. 4.8 d.  $\div$  20 s.

£28 5 s.

6784.8 d.  $\div$  12 d.

565.4 s.  $\div$  20 s.

£28.27

Hence, 6784.8 d. = £28 5 s. 4.8 d., or £28.27.

36. 19.5 bu. = 1,248 pt. = 2,496 half-pt. Hence, 2,496 measurefuls.

37. 3 qt. = .09375 bu.

38. 129 half-pk. = 64.5 pk. = 16.125 bu., or 16 bu. 4 qt.

39. 3,287 cts. = \$32 4 s. 7 cts.

40. 7,3125 s. = 87.75 d. = 351 qr.

41. 3 gal. 2 qt. = 28 pt. Hence, 28 bottles.

42. 549 qt. = 17 bu. 5 qt.      43. 3 bu. 1 pk. 5 qt. = 109 qt.

44. 2 hhd. 1 bar. 15.25 gal. = 691 qt.

45. 12,250 qt. = 382 bu. 3 pk. 2 qt.

## 46.

1,500 bu. 2 pk. = 6,002 pk. = 3,001 baskets.

3,001 baskets @ \$.75 = \$2,250.75.

47. 7 mi. 108 rd. 3 yd. 1 ft. = 38,752 ft.

48. 25 sq. rd. 3 sq. yd. 8 sq. ft. = 985,140 sq. in.
49. 7 cu. yd. 19 cu. ft. 960 cu. in. = 360,384 cu. in.
50. 18 cd. 5 cd. ft. 8 cu. ft. = 2,392 cu. ft.
51. 115,372 in. = 1 mi. 262 rd. 3 yd. 2 ft. 4 in.
52. 176,169 sq. in. = 4 sq. rd. 14 sq. yd. 8 sq. ft. 57 sq. in.
53. 1,001,100,100 cu. in. = 21,457 cu. yd. 1 cu. ft. 580 cu. in.
54. 12,875 cu. ft. = 100 cd. 75 cu. ft.
55. 7 mi. 284 rd. = 41,646 ft. Hence, 41,646 planks.
56. 23 cu. yd. 18 cu. ft. = 1,104,192 cu. in. Hence, 1,104,192 blocks.
57. 13 A. 96 sq. rd. = 65,824 sq. yd. Hence, 65,824 hills.
58. 131 cd. = 1,048 cd. ft. = 1,048 loads.
59. 2 mi. 125 rd. 1.5 ft. = 12,624 ft.
60. 126,720 in. = 2 mi. 61.  $(6 \times 6 =)$  36 sq. mi. = 23,040 A.
62. 4,305,780 sq. yd. = 1 sq. mi. 249 A. 99 sq. rd. 25.25 sq. yd.
63.  $(160 \times 4 \times 9 =)$  5,760 cu. ft. = 45 cd.
64. 25 cd. 7 cd. ft. 12.75 cu. ft. = 3324.75 cu. ft.
65. .9 ft. = 10.8 in. 66. 100.8 sq. rd. = .63 A.
67. .0015 mi. = .48 rd.
68. 468,018 cu. in. = 10.03125 cu. yd.
69.  $(125 \times 80 =)$  10,000 sq. rd. = 62 A. 80 sq. rd., or 62.5 A.
70. 1,145 bushels grew on 1,145 sq. rd. = 7 A. 25 sq. rd.
71. 80 rd., 40 rd., 32 rd., 20 rd., 16 rd.
72. 5,560 tiles = 5,560 ft. = 1 mi. 16 rd. 5 yd. 1 ft.
73. 1,000 in. = 27 yd. 2 ft. 4 in.
74.  $(52 \times 28 \times 8 =)$  11,648 cu. ft. = 431 cu. yd. 11 cu. ft.
75.  $(47 \times 14 \times 5.5 =)$  3,619 cu. ft. = 28 cd. 2 cd. ft. 3 cu. ft.
76.  $(6 \times 6 =)$  36 sq. mi.  $\times 20 =$  720 sq. mi. = 460,800 A.
77. 150 sq. rd. 95 sq. in. = 5,880,695 sq. in.
78. 5 mi. 109 rd. 4 yd. = 28210.5 ft.
79.  $(75 \times 7 =)$  525 sq. ft. surface measure = 16 cd. 3 cd. ft. 4 cu. ft.
80. 185.6 ft.  $\div$  8 ft. = 23.2 times = 23.2 cords.

$$81. (8 \times 87.5 \times 5.5 =) 3850 \text{ cu. ft.} = 30 \text{ cd. } 10 \text{ cu. ft.}$$

82.

$$2 \text{ mi. } 45 \text{ rd.} = 685 \text{ rd.}$$

$$(2 \times 685 \text{ rd.}) + (2 \times 225 \text{ rd.}) = 1,820 \text{ rd.}$$

$$83. (4.8 \times 1.75 =) 8.4 \text{ sq. mi.} = 5,876 \text{ A.}$$

84.

$$15 \text{ rd.} = 247.5 \text{ ft.}$$

$$(247.5 \times 35 =) 8662.5 \text{ sq. ft.} = 962.5 \text{ sq. yd.}$$

$$962.5 \times 4 \text{ persons} = 3,850 \text{ persons.}$$

$$85. 3 \text{ mi. } 75 \text{ ch. } 12 \text{ l.} = 31,512 \text{ l.}$$

$$86. 25,000,000 \text{ l.} = 3,125 \text{ mi.}$$

$$87. 8 \text{ A. } 14 \text{ P. } 462.5 \text{ sq. l.} = 809,212.5 \text{ sq. l.}$$

$$88. 236,754 \text{ sq. l.} = 2 \text{ A. } 3 \text{ sq. ch. } 10 \text{ P. } 504 \text{ sq. l.}$$

$$89. 21 \text{ l. } 3.75 \text{ in.} = 170.07 \text{ in.} ; 14.1725 \text{ ft.}$$

$$90. (215 \times 140 =) 30,100 \text{ sq. rd.} = 188.125 \text{ A.}$$

$$91. 9 \text{ sq. ch. } 11.25 \text{ P.} = 155.25 \text{ P.}$$

$$92. 7,254 \times 4 \text{ rd.} = 29,016 \text{ rd.} = 90.675 \text{ mi., or } 90 \text{ mi. } 54 \text{ ch.}$$

$$93. 16 \text{ Tp.} = 576 \text{ sq. mi.} = 368,640 \text{ A.}$$

$$94. 2.376 \text{ in.} = .3 \text{ l.} = .003 \text{ ch.}$$

$$95. 7 \text{ T. } 15 \text{ cwt. } 45 \text{ lb. } 9 \text{ oz.} = 248,729 \text{ oz.}$$

$$96. 1,999 \text{ oz.} = 1 \text{ cwt. } 24 \text{ lb. } 15 \text{ oz.}$$

$$97. 1 \text{ lb. } 9 \text{ oz.} = 10,080 \text{ gr.}$$

$$98. 5,190 \text{ gr.} = 10 \text{ oz. } 16 \text{ pwt. } 6 \text{ gr.}$$

$$99. 9 \text{ T. } 56 \text{ lb.} = 18,056 \text{ lb.} = 18,056 \text{ papers.}$$

$$100. 456 \times 4.25 \text{ pwt.} = 1,938 \text{ pwt.} = 8 \text{ lb. } 18 \text{ pwt.}$$

101

$$.6 \text{ gr.} \quad | \quad 24 \text{ gr.}$$

$$.025 \text{ pwt.} \quad | \quad 20 \text{ pwt.}$$

$$.00125 \text{ oz.} \quad \text{Hence, } .6 \text{ gr.} = .00125 \text{ oz.}$$

$$102. 11 \text{ oz. } 11 \text{ pwt. } 11 \text{ gr.} = 5,555 \text{ gr}$$

103.

$$2 \text{ T. } 16 \text{ cwt. } 95.75 \text{ lb.} = 5695.75 \text{ lb.}$$

$$5695.75 \text{ lb.} \div .25 \text{ lb.} = 22,783 \text{ times.} \quad \text{Hence, } 22,783 \text{ papers.}$$

104. .00021 T. = .0042 cwt. = .42 lb. = 6.72 oz.

105. 161,268 oz. = 5 T. 79.25 lb.

106. .008125 lb. Troy = 18 gr.

107.

2 lb. 9 oz. = 15,840 gr. Hence, 15,840 ft; and  
15,840 ft. = 3 mi.

108. 845,000 oz. = 52812.5 lb., or 26 T. 812 lb. 8 oz.

109. 2 T. 8 cwt. = 76,800 oz., and 76,800 oz.  $\div$  8 oz. = 9,600  
times = 9,600 papers.

110. .375 lb. Troy = 90 pwt.

111.  $1,250 \times 5$  lb. = 6,250 lb. = 3.125 T., or 3 T. 250 lb.

112. Mar. 31 da., Apr. 30 da., and May 31 da. = 92 da. =  
132,480 min.

113. July 27 da., Aug. 31 da., Sept. 30 da., Oct. 31 da., Nov.  
30 da., and Dec. 25 da. = 174 da. = 4,176 h.

114. 573,596 min. = 56 wk. 6 da. 7 h. 56 min.

115. 365 da. 5 h. 48 min. 48 sec. = 31,556,928 sec.

116. 1,000,000 sec. = 11 da. 13 h. 46 min. 40 sec.

117.

366 da. = 31,622,400 sec.; and  
 $31,622,400 \times 4$  times = 126,489,600 times.

118. 3 wk. 6 da. 23 h. 30 min. 45 sec. = 2,417,445 sec.

119.  $47^\circ 13'$  = 169,980". 120.  $59,300'' = 16^\circ 28' 20''$ .

121.  $1,426,444'' = 396^\circ 14' 4''$ , and  $396^\circ 14' 4'' - 360^\circ =$   
 $36^\circ 14' 4''$ .

122.  $8$  S.  $62.25^\circ = 108,810''$ .

123.  $.015^\circ = 54''$ .

124. 3 quadrants  $57^\circ 58' = 19,678'$ .

125.  $67,875'' = 18^\circ 51' 15''$ .

126.  $3' = .05^\circ$ .

127. 2,156 buttons = 14 gro. 11 doz. 8 buttons.

128.

1 gro. = 144 crayons, in 1 box;  
and 25 times 144 crayons = 3,600 crayons.

129.  $26 \times 56$  screws = 1,456 screws = 10 gro. 1 doz. 4 screws.

130. 7 gro. 8.5 doz. = 1,110 hooks.

131. 6 bales 1 bundle 4 rm. = 31,680 sheets.

132. 7,260 sheets = 15 rm. 2.5 quires.

133. 456 pp.  $\div$  24 pp. = 19 times = 19 sheets.

134. 648.5 folios @ \$.10 = \$64.85.

135. 6 grt. gro. 11 doz. pencils = 10,500 pencils.

136.

56,870 clothes-pins = 32 grt. gro. 10 gro. 11 doz. 2 clothes-pins.

Hence, 10 gro. 11 doz. 2 clothes-pins more than 32 boxes.

137.

456,120 words = 5,068 folios.

5,068 folios @ \$.12 $\frac{1}{2}$  = \$633.50.

138.  $52 \times 3,250$  sheets = 169,000 sheets = 352 rm. 1 quire 16 sheets.

139.  $5,160 \div 5 = 1,032 = 86$  doz.

140.

7 packages of 1 doz. boxes each = 84 boxes; and

84 boxes + 9 boxes 5 doz. 8 pens = 93 boxes 5 doz. 8 pens = 13,460 pens.

141.

216 pages, 18mo, = 6 sheets = 1 book.

$5,000 \times 6$  sheets = 30,000 sheets in the edition.

30,000 sheets (in books) +  $\frac{30,000 \text{ sheets}}{19}$  (for waste) =

31,579 sheets used; and

31,579 sheets = 65 rm. 15 quires 19 sheets.

142.

268.8 cu. in. = one half-peck, or 1 gallon dry measure.

231 " " = " gallon liquid " "

\*37.8 " " more in 1 gal. dry measure.

37.8 cu. in.  $\times$  568.5 = 21,489.3 cu. in. more in 568.5 gal.

143.

1st Solution.—32 qt. (dry measure)  $\times$  67.2 = 2,150.4 cu. in.

32 qt. (liquid measure)  $\times$  57.75 = 1,848 " "

302.4 cu. in.

= 5.236 + qt. liquid.

*2d Solution.*—1 qt. dry measure — 1 qt. liquid measure =  
67.2 cu. in. — 57.75 cu. in. = 9.45 cu. in.

$$9.45 \text{ cu. in.} \times 32 = 302.4 \text{ cu. in.}$$

*3d Solution.*—.5 pk. or 1 gal. dry measure = 268.8 cu. in.

$$1 \text{ gal. liquid " } = 231.$$

$$\begin{array}{r} 37.8 \text{ cu. in. gain} \\ \text{on 1 gal.} \end{array}$$

$$32 \text{ qt.} = 8 \text{ gal., and } 8 \times 37.8 \text{ cu. in.} = 302.4 \text{ cu. in.}$$

*4th Solution.*—32 qt. = 8 gal.

$$8 \text{ gal. dry measure} = 8 \times 268.8 \text{ cu. in.} = 2150.4 \text{ cu. in.}$$

$$8 \text{ " liquid " } = 8 \times 231 \text{ " " } = 1848 \text{ " "}$$

$$\begin{array}{r} 302.4 \text{ cu. in.} \end{array}$$

144.

1 lb. avoirdupois—1 lb. Troy=7,000 gr. — 5,760 gr.=1,240 gr.

$$42.375 \times 1,240 \text{ gr.} = 52,545 \text{ gr.}$$

145.

100 lb. avoirdupois are  $100 \times 7,000 \text{ gr.} = 700,000 \text{ gr.}$ ; and

$$700,000 \text{ gr.} = 121 \text{ lb. } 6 \text{ oz. } 6 \text{ pwt. } 16 \text{ gr.}$$

Or

$$100 \text{ lb.} \times 175 = 17,500 \text{ lb.}; \text{ and } 17,500 \text{ lb.} \div 144 = 121.527 + \text{lb.}$$

146.

$5,000 \times 231 \text{ cu. in.} = 1,155,000 \text{ cu. in.}$  in 5,000 gal.; and

$$1,155,000 \text{ cu. in.} \div 2150.4 \text{ cu. in.} = 537.109 + \text{bu.}$$

147.

3 bu. = 96 qt. 1 qt. dry measure = 67.2 cu. in.

$$1 \text{ " liquid " } = 57.75 \text{ " "}$$

Gain on 1 qt. 9.45 cu. in.

$$96 \times 9.45 \text{ cu. in.} = 907.2 \text{ cu. in.} = 16 \text{ liquid qt., nearly.}$$

$$96 \text{ qt.} + 16 \text{ qt.} = 112 \text{ qt.}; \text{ and } 112 \text{ qt.} @ \$ .20 = \$22.40, \text{ receipts}$$

$$3 \text{ bu. " } 5.00 = 15.00, \text{ cost.}$$

$$\$7.40, \text{ gain.}$$

148.

$$562 \text{ lb.} \times 175 = 98,350 \text{ lb.}; \text{ and}$$

$$98,350 \text{ lb.} \div 144 = 682 \text{ lb. } 11 \text{ oz. } 16 \text{ pwt. } 16 \text{ gr.}$$

## SECTION III.

## A D D I T I O N.

- |                                       |                                    |
|---------------------------------------|------------------------------------|
| 1. 39 bu. 1 pk.                       | 2. 307 gal. 2 qt. 1 pt.            |
| 3. 57 lb. 4 oz. 7 pwt. 19 gr.         | 4. $131^{\circ} 58' 46.05''$ .     |
| 5. £537 18 s. 5 d. 3 qr.              | 6. 238 cd.                         |
| 7. 384 T. 3 qr. 6 lb.                 | 8. 38 gal. 1.5 pt.                 |
| 9. 2,001 lb. 12 oz.                   | 10. 2 sq. mi. 61 A. 97.875 sq. rd. |
| 11. 60 T. 8 cwt. 1 lb.                | 12. 122 sq. yd. 142 sq. in.        |
| 13. 8 lb. steak; 9 lb. 11 oz. mutton. | 14. 2 mi. 17 ch. 94 l.             |
| 15. 325 cu. yd. 25 cu. ft.            |                                    |

17.

17 mi. 196 rd. 5 yd. 1 ft.

3	12	8	2	6 in.
1	76	4	1	4
2	156	5	2	8

2 yd. 1 ft. 6 in.

1 6

24 mi. 123 rd. 3 yd.

## SECTION IV.

## S U B T R A C T I O N.

- |                               |                               |
|-------------------------------|-------------------------------|
| 1. 8 bu. 2 pk. 2 qt.          | 2. 176 bu. 1 pk. 2 qt.        |
| 3. 7 gal. 2 qt. 1 pt. 3 gi.   | 4. 3 sq. mi. 243 A. 6 sq. ch. |
| 5. 38 lb. 2 oz.               | 6. 2 oz. 16 pwt. 21 gr.       |
| 7. 18 cwt. 29 lb.             | 8. 1,633 cd. 4 cd. ft.        |
| 9. $50^{\circ} 58' 12''$ .    | 10. 114 A. 72 sq. rd.         |
| 11. 113 cu. yd. 19 cu. ft.    | 12. 26 gal. 3 qt. 4 pt.       |
| 13. 233 sq. yd. 6 sq. ft.     | 14. 519 T. 3 lb.              |
| 15. 20 gro. 7 doz. 6 pencils. |                               |

16.  
 $(45 \times 22 \times 8 =) 7,920 \text{ cu. ft.} = 293 \text{ cu. yd. } 9 \text{ cu. ft.}$   
 $\begin{array}{r} 215 \\ 28.25 \text{ " "} \end{array}$
18.  
 25 mi. 0 rd. 0 yd. 2 ft. 11 in.  
 $\begin{array}{r} 132 \quad 3 \quad 0 \quad 8.75 \\ \hline 2 \text{ yd. } 2 \text{ ft. } 2.25 \text{ in.} \\ \quad \quad 1 \quad 6 \end{array}$
19.  
 1 mi. 171 rd. 4 yd. 1 ft. 6 in.  
 21. 1 yr. 4 mo. 14 da.
20.  
 24 mi. 187 rd. 3 yd. 0 ft. 8.25 in.  
 $\begin{array}{r} 82 \quad 1 \quad 4 \\ \hline \text{Difference, 1 in.} \end{array}$
22. 4 yr. 1 mo. 14 da.  
 23. 1 yr. 2 mo. 18 da.
24. Feb. 22, 1782.  
 26. Nov. 3, 1853.
27. 5 mo. 22 da.
28. 15 yr. 3 mo. 14 da. 29. 261 pch. 12.5 cu. ft.; 1 mo. 7 da.

## SECTION V.

### MULTIPLICATION.

1. 174 bu. 1 pk. 4 qt. 2. £78 2s. 6 d.  
 3. 206 cd. 5 cd. ft. 12 cu. ft. 4.  $845^{\circ} 41' 18''$ .  
 5. 76 mi. 45 ch. 84 l.
6.  
 $6 \times 6 \text{ forks} = 36 \text{ forks.}$   
 $1 \text{ oz. } 15 \text{ pwt. } 12 \text{ gr.} \times 86 = 5 \text{ lb. } 3 \text{ oz. } 18 \text{ pwt.}$
7. 99 cd. 4 cd. ft. 4 cu. ft. 8. 995 cu. yd. 6 cu. ft.  
 9. 646 lb. 14 oz. 10. 206 T. 6 cwt. 2 qr.
11. 4,014 mi. 58 rd. 4 yd. 2 ft. 8 in. 12.  
 13. 12 A. 10 sq. rd. 4.5 sq. yd. 38 rd. 5 yd.  
 14. 22 h. 7 min. 30 sec. 30
15. 21 gal. 3 qt. 3 mi. 207 rd. 1.5 yd, or  
 16. 53 T. 875 lb. 3 mi. 207 rd. 1 yd. 1 ft. 6 in.
17. 460 h. 25 min. 18. 623 mi. 200 rd.  
 19. 229 gal. 2 qt. 20. 69 common yr. 69 da.





19.

$$192 \text{ lb. } 3 \text{ oz.} = 3,075 \text{ oz.}$$

$$7 \text{ lb. } 11 \text{ oz.} = 123 \text{ oz.}$$

$$3,075 \text{ oz.} \div 123 \text{ oz.} = 25 \text{ times} = 25 \text{ weeks.}$$

20.

$$256,728 \text{ cu. in.} = 1111.376 + \text{liquid gal.}$$

$$256,728 \text{ cu. in.} = 3820.357 + \text{dry qt.}$$

21. 1 A. 32 sq. rd.

22. 26 mi. 111 rd. 1 ft. 6 in.

23. 99 spoons, and 27 pwt. or 1 oz. 3 pwt. left.

24.

$$14 \text{ A.} = 2,240 \text{ sq. rd.}$$

$$2,240 \text{ sq. rd.} \div 35 \text{ sq. rd.} = 64 \text{ times} = 64 \text{ rd.}$$

25.

$$521 \text{ mi.} = 2,750,880 \text{ ft.}$$

$$2,750,880 \text{ ft.} \div 18 \text{ ft.} \div 152,825 \text{ times} = 152,825 \text{ bars.}$$

26.

$$9 \text{ yd.} = 324 \text{ in., and } (324 \times 20 =) 6,480 \text{ sq. in. in 1 roll.}$$

$$(2 \times 14 \text{ ft.}) + (2 \times 16 \text{ ft.}) = 60 \text{ ft., and } (60 \times 9 =) 540 \text{ sq. ft.} =$$

$$77,760 \text{ sq. in. in the walls;}$$

$$77,760 \text{ sq. in.} \div 6,480 \text{ sq. in.} = 12 \text{ times} = 12 \text{ rolls of paper.}$$

## SECTION VII.

### *REVIEW PROBLEMS IN COMPOUND NUMBERS.*

1.  $(24 \times 18 =) 432 \text{ sq. ft.} = 48 \text{ sq. yd.}$

2. 1866 yr. 1 mo. 10 da. — 1865 yr. 6 mo. 17 da. = 6 mo. 23 da.

3.

$$128 \times 231 \text{ cu. in.} \div 29,568 \text{ cu. in.; and}$$

$$29,568 \text{ cu. in.} \div 2,150.4 \text{ cu. in.} = 13.75 \text{ times} =$$

$$13.75 \text{ bu.} = 13 \text{ bu. } 3 \text{ pk.}$$

4.

$$50 \text{ doz.} = 600 \text{ bottles, and } 600 \times 1 \frac{3}{4} \times 10 \text{ gr.} = 11 \text{ lb. } 5 \frac{3}{4} \text{ 3.}$$

5.

2,159 geographic mi. =  $2,159' = 35^{\circ} 59'$ ; and  
 $35^{\circ} 59' + 15^{\circ} 35' 40'' = 51^{\circ} 34' 40''$ , north.

6.

$(8 \times 7 \times 6 =) 336$  cu. ft. = 580,608 cu. in.  
 $580,608$  cu. in.  $\div 2150.4$  cu. in. = 270 times = 270 bu.

7.

31 bu. 1 pk. 5 qt. = 2,010 pt.; and  
 $2,010$  pt.  $\div 25$  pt. = 8,040 times. Hence, 8,040 papers.

8.

5 pieces of 35 yd. 3 qr. each = 178 yd. 3 qr. = 178.75 yd.;  
 $\frac{1}{4}$  yd. = .125 yd.; and  
 $178.75$  yd.  $\div .125$  yd. = 1,430 times. Hence, 1,430 pieces.

9.

6 lb. avoirdupois =  $6 \times 7,000$  gr. = 42,000 gr., and  
 $42,000$  gr. = 175 oz. apothecaries' weight.

175 oz.	@ \$ .30,	sells for \$52.50
6 lb.	" 3.50,	cost 21.00

He gains, \$31.50

10.

1,250 bar. of 196 lb. each = 245,000 lb., and  
 $245,000$  lb. = 122.5 T. = 122 T. 10 cwt.

11.

1,875 mi. - 7,260 ft., and  
 $7,260$  ft.  $\div 12$  ft. = 605 times = 605 logs.

12.

$(2 \times 18$  ft.) +  $(2 \times 15$  ft.) = 66 ft., length of walls;  
 $(66 \times 12 =) 792$  sq. ft. in walls;  
 $(18 \times 15 =) 270$  " " " ceiling;

Total area, 1,062 " " = 118 sq. yd.; and  
 $118$  sq. yd.  $\div 5$  sq. yd. = 23.6 times = 23.6 bunches of lath.

13.

The ditch was 120 rd. = 660 yd. long, and  
 $8$  ft. = 1 yd. wide.  
 $1,320$  cu. yd.  $\div (660 \times 1 =) 660$  cu. yd. = 2 times = 2 yd. = 6 ft.,  
the depth of the ditch.

14.

30 da. (June) + 31 da. (July) + 31 da. (Aug.) = 92 da. = 132,480 min.  
 31 " (Dec.) + 31 " (Jan.) + 28 " (Feb.) = 90 " = 129,600 "

In the summer months, 2,880 min.  
 [more.]

15.

Each shingle covers ( $4 \times 6 =$ ) 24 sq. in. of surface.

$144 \text{ sq. in.} \div 24 \text{ sq. in.} = 6 \text{ times} = 6 \text{ shingles required to cover}$   
 1 sq. ft.

$2 \times 22.5 \text{ ft.} = 45 \text{ ft.}$ , width of both sides of roof.

$(75 \times 45 =)$  3,375 sq. ft., area of roof to be covered.

$3,375 \times 6 \text{ shingles} = 20,250 \text{ shingles} = 40.5 \text{ bunches.}$

16.

25 rd. 4 ft. = 416.5 ft.

$(416.5 \times 5 =)$  2082.5 sq. ft. = 299,880 sq. in., area of walk.

$(4 \times 8 =)$  32 sq. in., area of 1 brick.

$299,880 \text{ sq. in.} \div 32 \text{ sq. in.} = 9371.25 \text{ times} = 9371.25 \text{ bricks.}$

17.

$(.5 \times .5 =)$  .25 sq. ft.; and

.5 sq. ft. — .25 sq. ft. = .25 sq. ft.

18.

12 ft. 6 in. = 150 in.; 11 mi. 28 rd. = 702,504 in.; and

$702,504 \text{ in.} \div 150 \text{ in.} = 4683.36 \text{ times.}$

19.

£19 4.5 d. = £19 0 s. 4 d. 2 gr.  
 $\begin{array}{r} 17 \ 19 \ 0 \ 3.875 \\ \hline \end{array}$

£1 1 s. 3 d. 2.125 gr. = 1022.125 gr.

20.

$15 \times 42 \text{ yd.} = 630 \text{ yd.}$ ; and

$630 \text{ yd.} @ 2 \text{ s.} = 1,260 \text{ s.} = £63.$

21.

1,080 = 7.5 gro.; and

$7.5 \text{ gro.} @ 7 \text{ s.} = 52.5 \text{ s.} = £2 \ 12 \text{ s.} \ 6 \text{ d.}$

22.  $(215 \times 140 =)$  30,100 sq. rd. = 188.125 A.

23. 1 T. = 20 cwt., and 20 cwt. @ \$1.375 = \$27.50.

24.  $(218 \times 3 \times 1.5 =)$  981 cu. ft. = 7 cd. 5 cd. ft. 5 cu. ft.

25.  $(183 \times 6 \times 4 =) 4,392$  cu. ft. = 34 cd. 2 cd. ft. 8 cu. ft.

26. .02875 bu. = .92 qt.

27.

$(50 \times 20 \times 1 =) 1,000$  cu. ft.  $\times 3 = 2,000$  cu. ft. in the walls.

$22.5$  bricks  $\times 2,000 = 45,000$  bricks.

28.

$(14 \times 11 \times 7.5 =) 1,155$  cu. ft. = 1,995,840 cu. in.; and

1,995,840 cu. in. = 8,640 gal. = 137 hhd. 9 gal.

29.

12.25 cd. = 1,568 cu. ft.

$(56 \times 8 =) 448$  cu. ft. in 1 ft. wide.

$1,568$  cu. ft.  $\div 448$  cu. ft. = 3.5 times = 3.5 ft., the width.

30.

$(5 \times 8 =) 40$  sq. rd.; 3.5 A. = 560 sq. rd.; and

$560$  sq. rd.  $\div 40$  sq. rd. = 14 times = 14 lots.

31.

15 bar. of pork weigh 3,000 lb.

12 " " flour " 2,252 "

6 casks of nails " 600 "

8 bar. " salt " 2,240 "

Entire weight, 8,192 lb. = 4 T. 192 lb.

32.

2 bu. 3 pk. = 88 qt. = 5913.6 cu. in.; and

$5913.6$  cu. in.  $\div 57.75$  cu. in. = 102.4 times = 102.4 qt., tin measure.

33.

18 bar. of pork = 3,600 lb., and

3,600 lb. @ \$.12 $\frac{1}{2}$  = \$450.

34.  $420$  qt.  $\times 14 = 5,880$  qt. = 1,470 gal. = 46 bar. 21 gal.

35.  $3$  qt.  $\times 21 = 63$  qt. = 1 bu. 3 pk. 7 qt.

36.

$(2 \times 40$  ft.) +  $(2 \times 30$  ft.) = 140 ft., length of walls.

$(140 \times 20 =) 2,800$  sq. ft. = 311 sq. yd. 1 sq. ft.

37.  $(80 \times 40 =) 1,200$  sq. ft. = 133 sq. yd. 3 sq. ft.

38.

2,240 lb. (1 gross ton) - 2,000 lb. (1 net ton) = 240 lb., gain on 1 gross ton.

225 × 240 lb. = 54,000 lb. = 27 net T., gain on 225 gross T.

225 T. + 27 T. = 252 T. sold.

225 gross T. @ \$4.75 cost      \$1068.75

252 net T.    "    6.50 sold for    1638.00

Gain, \$569.25

39. (11 × 13 =) 143 sq. ch. = 14.3 A., or 14 A. 3 sq. ch.

40. 1,000,000 cu. in. = 21 cu. yd. 11 cu. ft. 1,216 cu. in.

41.

1,000,000 sq. in. = 25 sq. rd. 14.75 sq. yd. 5 sq. ft. 64 sq. in., or  
25 sq. rd. 15      sq. yd. 3 sq. ft. 28 sq. in.

42.

175 bu. × 5.5 = 962.5 bu. = 350 bar.

350 bar. @ \$2.75 = \$962.50

43. 100 yr. = 36,524 da.

44. 360° = 1,296,000".

45. 8 rm. 2 quires 12 sheets = 1,500 sheets = 6,000 quarter-sheets.

46. 412.5 gr. × 10,000 = 4,125,000 gr. = 716 lb. 1 oz. 15 pwt.

47.

25 T. 625 lb. = 50,625 lb.; and

50,625 lb. ÷ 1,125 lb. = 45 times = 45 loads.

45 loads @ \$8.37½ = \$376.87½.

48.

\$1,000,000 ÷ \$80 = 12,500 times = 12,500 min.

12,500 min. = 20 days of 10 h. each, and 8 h. 20 min

49.

3.75 bu. = 8,064 cu. in. = 140 qt., tin measure.

140 qt. @ \$ .25 = \$35

3.75 bu. "    6.75 =    25.3125

Gain, \$9.68½

50.

35 lb. - 28 lb. = 7 lb., gain on 1 bushel.

5,600  $\times$  7 lb. = 39,200 " " " 5,600 bushels.39,200 lb.  $\div$  28 = 1,400 bu. gain.

1,400 bu. + 5,600 bu. = 7,000 bu. sold.

7,000 bu. @ \$.75 = \$5,250 received.

First cost of 5,600 bu. @ \$.37 $\frac{1}{2}$ , \$2,100Freight on 5,600 bu. " .31 $\frac{1}{4}$ , 1,750 3,850, cost.

\$1,400, gain.

# CHAPTER IV. FACTORS AND MULTIPLES.

## SECTION II.

### CASE IV.

#### Cancellation.

1.

$$\frac{\overset{17}{\cancel{714}}}{\cancel{42}} = 17$$

2.

$$\frac{\overset{3}{\cancel{21}} \times 13}{\cancel{7}} = 3 \times 13 = 39$$

3.

$$\frac{\overset{5}{\cancel{75}}}{\cancel{825}} = 5$$

4.

$$\frac{\overset{7}{\cancel{28}} \times \overset{1.8}{\cancel{7.2}}}{\cancel{4}} = 7 \times 1.8 = 12.6$$

5.

$$\frac{\overset{.1}{\cancel{8}} \times 25 \times \overset{.1}{\cancel{45}}}{\cancel{15} \times \cancel{2} \times \overset{.3}{\cancel{1.2}}} = 25 \times .1 = 2.5$$

6.

$$\frac{\overset{8}{\cancel{85}} \times \cancel{16}}{\cancel{810}} = 8 \text{ times} = 8 \text{ tons.}$$

7.

$$\frac{\overset{7}{\cancel{63}} \times \overset{7}{\cancel{35}}}{\cancel{45}} \text{ days} = 7 \times 7 \text{ days} = 49 \text{ days.}$$

8.

$$\frac{\$ \overset{22}{\cancel{22}} \times \overset{6}{\cancel{12}}}{\cancel{28}} = \$22 \times 6 = \$132.$$



9.

$$\begin{array}{r} \$800 \quad 2 \\ \$2400 \times 12 \\ \hline 18 \\ 3 \end{array} = \$800 \times 2 = \$1,600$$

10.

$$\begin{array}{r} 28 \text{ bu.} \\ 120 \text{ bu.} \times 35 \\ \hline 15 \end{array} = \$28 \text{ bu.} \times 35 = 980 \text{ bu.}$$

11.

$$\begin{array}{r} 4 \quad 13 \\ 76 \text{ days} \times 39 \\ \hline 57 \\ 19 \end{array} = 4 \text{ days} \times 13 = 52 \text{ days.}$$

12.

$$\begin{array}{r} 45320 \quad 12 \\ 407880 \text{ bricks} \times 11 \times 60 \\ \hline 9 \times 55 \\ 5 \end{array} = 45,320 \text{ bricks} \times 12 = 543,840 \text{ [bricks]}$$

13.

$$\begin{array}{r} 558 \quad 8 \\ 2790 \text{ words} \times 72 \\ \hline 45 \\ 5 \end{array} = 558 \text{ words} \times 8 = 4,464 \text{ words.}$$

---

## SECTION IV.

### PRIME NUMBERS.

1. 19, 67.      2. 103, 131.      3. 111, 133, 147, 219, 342.
4. Prime, 293, 617; composite, 371, 385, 440, 524, 713.
5. Prime, 911, 1033, 3,373, 3,407; composite, 973, 1057, 35841.
6. 1, 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97.

# SECTION V. COMMON DIVISORS.

## CASE I.

### Prime Factors or Divisors.

1. 2, 2, 5, 8, 3, 3.

3. 2, 2, 3, 3, 3, 17.

5.

$$\begin{array}{r} 84 \div 2 \\ \hline 42 \div 2 \\ \hline 21 \div 3 \\ \hline 7 \end{array}$$

2

3

7

$4 = 2 \times 2$

$6 = 2 \times 3$

$12 = 2 \times 2 \times 3$

$14 = 2 \times 7$

$21 = 3 \times 7$

$28 = 2 \times 2 \times 7$

$42 = 2 \times 3 \times 7.$

2. 5, 5, 2, 3, 11; 5, 3, 3, 3, 13.

4. 5, 3, 3, 3, 7, ; 5, 3, 2, 7, 19.

6. Prime factors, 2, 2, 41.

Component factors, 4, 82.

## CASE II.

### Common Factors or Divisors.

7.

$21 = 3 \times 7$

$36 = 3 \times 3 \times 4$

Hence, 3.

10.

$36 = 2 \times 3 \times 6$

$42 = 2 \times 3 \times 7$

$90 = 2 \times 3 \times 15$

Hence, 2, 3, and

$6 (= 2 \times 3).$

8.

$4.5 = 1.5 \times 3$

$10.5 = 1.5 \times 7$

Hence, 1.5.

9.

$20 = 2 \times 10$

$32 = 2 \times 16$

$56 = 2 \times 28$

$18 = 2 \times 9$

11. Hence, 2.

$64 = 2 \times 2 \times 2 \times 2 \times 4$

$112 = 2 \times 2 \times 2 \times 2 \times 7$

$48 = 2 \times 2 \times 2 \times 2 \times 3$

$144 = 2 \times 2 \times 2 \times 2 \times 9$

$2, 4 (= 2 \times 2), 8 (= 2 \times 2 \times 2),$

$16 (= 2 \times 2 \times 2 \times 2).$

Hence, four common divisors.

## CASE III.

## Greatest Common Factor or Divisor.

12.

$$\begin{array}{r} 84 \overline{) 56} \\ \underline{56} \phantom{0} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

Hence, 28 is the greatest,  
common divisor.

13.

$$\begin{array}{r} .153 \overline{) .102} \\ \underline{.1000} \phantom{0} \\ .153 \phantom{0} \\ \underline{.102} \phantom{0} \\ 51 \end{array}$$

$$\begin{array}{r} 102 \overline{) 51} \\ \underline{51} \\ 0 \end{array}$$

Hence, 51, greatest common  
divisor.

14.

Of 96 and 120.

$$\begin{array}{r} 120 \overline{) 96} \\ \underline{96} \phantom{0} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

Of 24 and 168.

$$\begin{array}{r} 168 \overline{) 24} \\ \underline{168} \\ 0 \end{array}$$

Hence, 24.

15.

$$\begin{array}{r} 96 \overline{) 76} \\ \underline{76} \\ 0 \end{array}$$

$$\begin{array}{r} 76 \overline{) 20} \\ \underline{60} \\ 16 \end{array}$$

$$\begin{array}{r} 20 \overline{) 16} \\ \underline{16} \\ 0 \end{array}$$

$$\begin{array}{r} 16 \overline{) 4} \\ \underline{16} \\ 0 \end{array}$$

Hence, 4 rods.

16.

$$\begin{array}{r} \$80 \overline{) \$25} \\ \underline{50} \phantom{0} \\ 25 \end{array}$$

$$\begin{array}{r} \$25 \overline{) \$10} \\ \underline{20} \phantom{0} \\ 10 \end{array}$$

$$\begin{array}{r} \$10 \overline{) \$5} \\ \underline{10} \\ 0 \end{array}$$

Hence, 5, or \$5.

$$\begin{array}{r} 12 \text{ sq. rd.} \overline{) 4 \text{ sq. rd.}} \\ \underline{12} \\ 0 \end{array}$$

Hence, 4, or 4 sq. rd.

17.

16 A. = 2,560 sq. rd.

$$\begin{array}{r} 2,560 \text{ sq. rd.} \overline{) 28 \text{ sq. rd.}} \\ \underline{252} \phantom{0} \\ 40 \end{array}$$

$$\begin{array}{r} 40 \overline{) 28} \\ \underline{28} \\ 0 \end{array}$$

$$\begin{array}{r} 28 \text{ sq. rd.} \overline{) 12 \text{ sq. rd.}} \\ \underline{28} \\ 0 \end{array}$$

$$\begin{array}{r}
 18. \\
 225 \overline{) 135} \left\{ \begin{array}{l} 135 \\ 1 \end{array} \right. \\
 \underline{135} \\
 90 \overline{) 90} \left\{ \begin{array}{l} 90 \\ 1 \end{array} \right. \\
 \underline{90} \\
 90 \overline{) 45} \\
 \underline{90} \quad 2
 \end{array}$$

Hence, 45.

19.

$$\begin{aligned}
 1 \text{ pk.} &= 8 \text{ qt.} \\
 8 \text{ qt.} &= 2 \times 4 \text{ qt.} \\
 6 \text{ qt.} &= 2 \times 3 \text{ qt.} \\
 \text{Hence, } 2.
 \end{aligned}$$

20.

$$\begin{aligned}
 168 \text{ ft.} &= 2 \text{ ft.} \times 7 \times 12 \\
 280 \text{ ft.} &= 2 \text{ ft.} \times 7 \times 20 \\
 182 \text{ ft.} &= 2 \text{ ft.} \times 7 \times 13 \\
 252 \text{ ft.} &= 2 \text{ ft.} \times 7 \times 18 \\
 \text{Hence, } 2 \text{ ft.} \times 7 &= 14 \text{ ft.}
 \end{aligned}$$

21.

$$\begin{aligned}
 288.5 \text{ yd.} &= 3 \text{ yd.} \times 3 \times 3 \times 3 \times .5 \times 7 \\
 567.0 \text{ yd.} &= 3 \text{ yd.} \times 3 \times 3 \times 3 \times .5 \times 14 \\
 445.5 \text{ yd.} &= 3 \text{ yd.} \times 3 \times 3 \times 3 \times .5 \times 11 \\
 \text{Hence, } 3 \text{ yd.} \times 3 \times 3 \times 3 \times .5 &= 40.5 \text{ yd.}
 \end{aligned}$$

---

## SECTION VI.

### COMMON MULTIPLES,

#### CASE I.

##### Common Multiples or Dividends.

1.  $3 \times 4 \times 6 = 72.$
2.  $5 \times 7 \times 32 \times 10 = 11,200.$
3.  $4.8 \times 9 \times 5.25 = 226.8.$
4.  $\$15 \times 2 \times 8.50 = \$255.$

5.

$$\begin{aligned}
 1 \text{ bu. } 3 \text{ pk.} &= 56 \text{ qt.} \\
 1 \text{ pk. } 4 \text{ qt.} &= 12 \text{ qt.} \\
 5 \text{ qt. } 1 \text{ pt.} &= 5.5 \text{ qt.} \\
 56 \text{ qt.} \times 12 \times 5.5 &= 3,696 \text{ qt.} = 115 \text{ bu. } 2 \text{ pk.}
 \end{aligned}$$

## CASE II.

## Least Common Multiples or Dividends.

6.

$$8 = 2 \times 2 \times 2$$

$$12 = 2 \times 2 \times 3$$

$$14 = 2 \times 7$$

$$2 \times 2 \times 2 \times 3 \times 7 = 168$$

7.

$$\$16 = \$2 \times 2 \times 2 \times 2$$

$$\$20 = \$2 \times 2 \times 5$$

$$\$2 \times 2 \times 2 \times 2 \times 5 = \$80$$

8.

$$.8 = 2 \times 2 \times .2$$

$$.6 = 2 \times .3$$

$$2 \times 2 \times .2 \times .3 = .24$$

9.

$$75 = 5 \times 5 \times 3$$

$$225 = 5 \times 5 \times 3 \times 3$$

$$500 = 5 \times 5 \times 5 \times 2 \times 2$$

$$5 \times 5 \times 5 \times 2 \times 2 \times 3 \times 3 = 4,500$$

$$10. 36 \times 18 \times 24 \times 12 = 186,624.$$

11.

$$36 = 2 \times 2 \times 3 \times 3$$

$$18 = 2 \times 3 \times 3$$

$$24 = 2 \times 2 \times 2 \times 3$$

$$12 = 2 \times 2 \times 3$$

$$2 \times 2 \times 2 \times 3 \times 3 = 72$$

12.

From 286 it is evident that, in finding the least common multiple of several numbers, we may omit such of the smaller numbers as are factors of the larger ones. We therefore arrange the numbers in order, from least to greatest, then strike out or drop all the smaller numbers which are factors of any of the larger ones, and then find the least common multiple of the remaining numbers, as shown in the

## SOLUTION.

$$2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 36, 48, 72.$$

$$48 = 2 \times 2 \times 2 \times 2 \times 3$$

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

$$2 \times 2 \times 2 \times 2 \times 3 \times 3 = 144$$

13.

9, 12, 15, 18, 35, 45, 60, 72.

$$35 = 5 \times 7$$

$$45 = 3 \times 3 \times 5$$

$$60 = 2 \times 2 \times 3 \times 5$$

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

$$2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 7 = 2,520$$

14.

1, 2, 3, 4, 5, 6, 7, 8, 9.

$$5 = 5$$

$$6 = 2 \times 3$$

$$7 = 7$$

$$8 = 2 \times 2 \times 2$$

$$9 = 3 \times 3$$

$$2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 7 = 2,520$$

15.

$$2 \text{ yd. } 1 \text{ ft.} = 84 \text{ in.}$$

$$2 \text{ ft. } 8 \text{ in.} = 32 \text{ in.}$$

$$84 \text{ in.} = 2 \text{ in.} \times 2 \times 3 \times 7$$

$$32 \text{ in.} = 2 \text{ in.} \times 2 \times 2 \times 2 \times 2$$

$$2 \text{ in.} \times 2 \times 2 \times 2 \times 2 \times 3 \times 7 = 672 \text{ in.}$$

$$672 \text{ in.} = 2 \text{ rd. } 1.5 \text{ yd. } 2 \text{ ft., or}$$

$$3 \text{ rd. } 2 \text{ yd. } 6 \text{ in.}$$

16.

$$\$85 = \$5 \times 17$$

$$\$35 = \$5 \times 7$$

$$\$5 \times 17 \times 7 = \$595.$$

17.

$$20 \text{ min.} = 2 \times 2 \times 5 \text{ min.}$$

$$30 \text{ min.} = 2 \times 3 \times 5 \text{ min.}$$

$$35 \text{ min.} = 5 \times 7 \text{ min.}$$

$$2 \times 2 \times 5 \times 3 \times 7 \text{ min.} = 420 \text{ min.} = 7 \text{ h.}$$

18.

$$25 \text{ sec.} = 5 \text{ sec.} \times 5$$

$$30 \text{ sec.} = 5 \text{ sec.} \times 2 \times 3$$

$$50 \text{ sec.} = 5 \text{ sec.} \times 5 \times 2$$

$$5 \text{ sec.} \times 5 \times 2 \times 3 = 150 \text{ sec.} = 2 \text{ min. } 30 \text{ sec.}$$

# CHAPTER V.

## F R A C T I O N S .

### SECTION II.

#### *R E D U C T I O N S .*

#### C A S E I .

Fractions to Lowest Terms.

1.  $\frac{11}{11} = 1$ . 2.  $\frac{11}{11} = \frac{2}{2}$ ;  $\frac{11}{11} = \frac{3}{3}$ .
3.  $\frac{11}{11} = \frac{1}{1}$ ;  $\frac{11}{11} = \frac{2}{2}$ ;  $\frac{11}{11} = \frac{3}{3}$ . 4.  $\frac{11}{11} = \frac{11}{11} = \frac{1}{1} = \frac{1}{1}$ .
5.  $\frac{11}{11} = \frac{1}{1}$ ;  $\frac{11}{11} = \frac{1}{1}$ .
6.  $\frac{11}{11} = \frac{1}{1}$ ;  $\frac{11}{11} = \frac{1}{1}$ ;  $\frac{11}{11} = \frac{1}{1}$ ;  $\frac{11}{11} = \frac{1}{1}$ .

#### C A S E II.

Fractions to Given Denominators.

- |  |  |
|--|--|
| <p style="text-align: center;">7.</p> $\frac{16}{4} \mid 4 \quad \frac{1}{4} \times 4 = \frac{4}{4}$     | <p style="text-align: center;">8.</p> $\frac{10}{2} \mid 5 \quad \frac{1}{2} \times 5 = \frac{5}{2}$     |
| <p style="text-align: center;">9.</p> $\frac{63}{9} \mid 7 \quad \frac{1}{7} \times 9 = \frac{9}{7}$     | <p style="text-align: center;">10.</p> $\frac{54}{6} \mid 9 \quad \frac{1}{9} \times 6 = \frac{6}{9}$    |
| <p style="text-align: center;">11.</p> $\frac{84}{7} \mid 12 \quad \frac{1}{12} \times 7 = \frac{7}{12}$ | <p style="text-align: center;">12.</p> $\frac{60}{12} \mid 5 \quad \frac{1}{5} \times 12 = \frac{12}{5}$ |

$$\begin{array}{rcl}
 & 12. & \\
 26 \overline{) 13} & \frac{2}{13} \times \frac{2}{2} = \frac{4}{26} & \\
 \underline{2} & & \\
 65 \overline{) 13} & \frac{2}{13} \times \frac{5}{5} = \frac{10}{65} & \\
 \underline{5} & & \\
 91 \overline{) 13} & \frac{2}{13} \times \frac{7}{7} = \frac{14}{91} & \\
 \underline{7} & &
 \end{array}$$

## CASE III.

Dissimilar Fractions to Similar Fractions.

$$\begin{array}{llll}
 13. & 14. & 15. & 16. \\
 \frac{1}{2} \times \frac{2}{2} = \frac{2}{4} & \frac{5}{6} \times \frac{5}{5} = \frac{25}{30} & \frac{5}{9} \times \frac{12}{12} = \frac{60}{108} & \frac{2}{3} \times \frac{5}{5} \times \frac{8}{8} = \frac{80}{120} \\
 \frac{2}{3} \times \frac{2}{2} = \frac{4}{6} & \frac{4}{5} \times \frac{6}{6} = \frac{24}{30} & \frac{7}{9} \times \frac{9}{9} = \frac{63}{81} & \frac{3}{4} \times \frac{3}{3} \times \frac{8}{8} = \frac{72}{96} \\
 & & & \frac{5}{8} \times \frac{3}{3} \times \frac{5}{5} = \frac{75}{120} \\
 17. \frac{1}{2}, \frac{2}{3} = \frac{3}{6}, \frac{4}{6}. & & & \\
 18. \frac{2}{3}, \frac{3}{4}, \frac{4}{5} = \frac{8}{12}, \frac{9}{12}, \frac{8}{10}, \frac{7}{10}. & & & \\
 19. \frac{2}{11}, \frac{5}{7}, \frac{2}{3}, \frac{7}{12} = \frac{2780}{4620}, \frac{3300}{4620}, \frac{1540}{4620}, \frac{2638}{4620}. & & & \\
 20. \frac{5}{6}, \frac{5}{7}, \frac{5}{10} = \frac{450}{420}, \frac{400}{420}, \frac{350}{420}. & & &
 \end{array}$$

## CASE IV.

Dissimilar Fractions to Least Similar Fractions.

$$\begin{array}{ll}
 21. & 22. \\
 9 = 3 \times 3 & \frac{6}{15} = \frac{2}{5} \\
 6 = 3 \times 2 & 5 = 5 \\
 3 \times 3 \times 2 = 18 & 10 = 2 \times 5 \\
 18 \overline{) 9} & \frac{2}{3} \times \frac{2}{2} = \frac{4}{6} \\
 \underline{2} & 2 \times 5 = 10 \\
 18 \overline{) 6} & 10 \overline{) 5} \frac{2}{2} \times \frac{2}{2} = \frac{4}{10} \\
 \underline{8} & 2 & \frac{7}{10} = \frac{7}{10} \\
 & 23. \\
 & 6 = 2 \times 3 \\
 & 4 = 2 \times 2 \\
 & 2 \times 3 \times 2 = 12 \\
 & 12 \overline{) 6} & \frac{1}{2} \times \frac{2}{2} = \frac{2}{2} \\
 & \underline{2} & \\
 & 12 \overline{) 4} & \frac{2}{4} \times \frac{3}{3} = \frac{6}{12}
 \end{array}$$



24.

$$\begin{aligned}
 9 &= 3 \times 3 \\
 4 &= 2 \times 2 \\
 18 &= 3 \times 3 \times 2 \\
 6 &= 3 \times 2 \\
 3 \times 3 \times 2 \times 2 &= 36 \\
 36 \overline{) 9} \quad \frac{5}{9} \times 4 &= \frac{20}{9} \\
 4 \\
 36 \overline{) 4} \quad \frac{1}{4} \times \frac{9}{9} &= \frac{9}{36} \\
 9 \\
 36 \overline{) 18} \quad \frac{7}{18} \times \frac{2}{2} &= \frac{14}{36} \\
 2 \\
 36 \overline{) 6} \quad \frac{5}{6} \times \frac{6}{6} &= \frac{30}{36} \\
 6
 \end{aligned}$$

25.  $\frac{5}{12}, \frac{1}{8}, \frac{2}{3} = \frac{10}{24}, \frac{3}{24}, \frac{16}{24}$ .

26.  $\frac{11}{15}, \frac{4}{5}, \frac{7}{6}, \frac{28}{45}, \frac{1}{3} = \frac{22}{45}, \frac{24}{45}, \frac{28}{45}, \frac{28}{45}, \frac{15}{45}$ .

27.

$\frac{8}{9} = \frac{4}{\frac{9}{2}}; \frac{2}{3}; \frac{5}{7} = \frac{5}{14}; \text{ and } \frac{63}{108} = \frac{7}{12}$ .

$8 = 2 \times 2 \times 2$

$14 = 2 \times 7$

$12 = 2 \times 2 \times 3$

$2 \times 2 \times 2 \times 3 \times 7 = 168$

Hence,  $\frac{1}{168}$ .

## CASE V.

Improper Fractions to Integers or Mixed Numbers.

28.

$$\begin{aligned}
 &12 \text{ fourths. } \overline{) 4 \text{ fourths.}} \\
 &3 \text{ times} = 3 \text{ apples.}
 \end{aligned}$$

29.

$$\begin{aligned}
 &56 \text{ eighths. } \overline{) 8 \text{ eighths.}} \\
 &7 \text{ times} = 7 \text{ miles.}
 \end{aligned}$$

30.

$$\begin{aligned}
 &19 \text{ fourths. } \overline{) 4 \text{ fourths.}} \\
 &4\frac{3}{4}
 \end{aligned}$$

31.

$$\begin{aligned}
 &143 \text{ thirteenths. } \overline{) 13 \text{ thirteenths.}} \\
 &11
 \end{aligned}$$

32.

$$\begin{aligned}
 &74 \text{ sixteenths yd. } \overline{) 16 \text{ sixteenths yd.}} \\
 &4\frac{1}{2} \text{ times} = 4\frac{1}{2} \text{ yd.}
 \end{aligned}$$

$$\begin{aligned}
 33. \quad \$12^{\frac{2}{3}} &= \$12\frac{2}{3}; \quad 1\frac{1}{4} \text{ da.} = 1\frac{3}{4} \text{ da.}; \quad 1\frac{3}{4} = 7; \quad 2\frac{3}{4} \text{ ft.} = \\
 &2\frac{3}{4} \text{ ft.}; \quad 2\frac{3}{4} \text{ cu. yd.} = 85\frac{3}{4} \text{ cu. yd.}; \quad 1000 \text{ lb.} = 625 \text{ lb.}
 \end{aligned}$$

34.  $\$2^{\frac{2}{3}} = \$7\frac{1}{3}$ .

35.  $\frac{5}{6}, \frac{2}{3}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}, \frac{1}{10} = 6\frac{2}{3}, 7\frac{1}{2}, 9, 5\frac{1}{5}, 266$ .

## CASE VI.

Integers or Mixed Numbers to Improper Fractions.

$$\begin{array}{r} 36. \\ 7 \text{ sevenths.} \quad 9 \text{ ninths.} \\ \underline{12} \quad \quad \quad \underline{13} \end{array}$$

$$84 \text{ sevenths. } 117 \text{ ninths.}$$

$$\text{Hence, } 12 = \frac{84}{7}; \text{ and } 13 = \frac{117}{9}.$$

$$37.$$

$$\begin{array}{r} 5\frac{3}{8} \\ \underline{8} \end{array}$$

$$40 + 3 = 43$$

$$\text{Hence, } 5\frac{3}{8} = \frac{43}{8}.$$

$$38.$$

$$\begin{array}{r} 19\frac{3}{4} \\ \underline{4} \end{array}$$

$$76 + 3 = 79$$

$$\text{Hence, } 19\frac{3}{4} = \frac{79}{4}.$$

$$39. 5\frac{2}{18}, 43\frac{1}{9} = \frac{47}{18}, \frac{1243}{18}.$$

$$40. 15\frac{5}{12}, 17\frac{1}{3} = \frac{133}{12}, \frac{151}{12}.$$

$$41. 14\frac{13}{18}, 12\frac{5}{9}, 11\frac{8}{9} = \frac{227}{18}, \frac{401}{18}, \frac{191}{9}.$$

$$42. 365\frac{1}{2} \text{ da.} = 14\frac{61}{2} \text{ da.}$$

$$43. \frac{587}{1866} = \frac{133}{422} = \frac{63}{207} = \frac{21}{73} = \frac{7}{23}.$$

$$44. \frac{153}{9} \mid 17 \quad \frac{1}{17} \times \frac{9}{9} = \frac{99}{153}$$

$$45. \frac{3}{15}, \frac{4}{21}, \frac{5}{27} = \frac{132}{415}, \frac{160}{415}, \frac{220}{415}.$$

$$46. \frac{7}{8}, \frac{7}{9}, \frac{7}{10} = \frac{525}{720}, \frac{560}{720}, \frac{504}{720}.$$

$$47. \frac{5}{12}, \frac{13}{12}, \frac{4}{15}, \frac{3}{10} = \frac{220}{480}, \frac{135}{480}, \frac{128}{480}, \frac{144}{480}.$$

$$48. \frac{51}{7}, \frac{213}{8}, \frac{126}{9}, \frac{151}{10}, \frac{117}{12} = 8\frac{5}{7}, 71, 7, 30\frac{1}{10}, 9.$$

$$49. 59 = 24\frac{21}{2}, \text{ or } \frac{531}{2}.$$

$$50. \frac{1}{5}, \frac{3}{7}, \frac{4}{15}, \frac{1}{21}, \frac{11}{35} = \frac{21}{105}, \frac{45}{105}, \frac{28}{105}, \frac{5}{105}, \frac{33}{105}.$$

$$51.$$

$$26 = 13 \times 2$$

$$39 = 13 \times 3$$

$$12 = 2 \times 2 \times 3$$

$$52 = 2 \times 2 \times 13$$

$$2 \times 2 \times 13 \times 3 = 156$$

$$\text{Hence, } \frac{1}{156}.$$

$$52. \frac{140}{1376} = \frac{5}{48}; \frac{221}{1336} = \frac{3}{8}; \frac{73}{5088} \text{ is in its lowest terms.}$$

$$53. \frac{2}{15} = \frac{15}{112}, \text{ or } \frac{27}{171}, \text{ or } \frac{23}{205}.$$



12.

$$\begin{array}{r} 13\frac{3}{4} \text{ cd.} = 12\frac{3}{4} \text{ cd.} \\ 1\frac{7}{8} \text{ " } = 1\frac{1}{4} \text{ " } \\ \hline 11\frac{1}{2} \text{ cd.} \end{array}$$

13.  $\$9\frac{7}{10} + \$3\frac{1}{2} = \$13\frac{1}{2}$ .

14.

FIRST SOLUTION.

$$\begin{array}{l} \$3\frac{1}{2} = \$3\frac{2}{10}; \\ \$2\frac{1}{2} = \$2\frac{2}{10}; \text{ and} \\ \$3\frac{2}{10} - \$2\frac{2}{10} = \$1\frac{0}{10} \end{array}$$

SECOND SOLUTION.

$$\begin{array}{l} \$3\frac{1}{2} = \$3\frac{1}{2} \\ \$2\frac{1}{2} = \frac{5}{10} \\ \hline \$2\frac{2}{10} \end{array}$$

15.

$$\begin{array}{l} 12\frac{7}{10} \text{ A.} = 12\frac{8}{10} \text{ A.} \\ 15\frac{3}{8} \text{ " } = 15\frac{4}{10} \text{ " } \\ 13\frac{5}{12} \text{ " } = 13\frac{5}{10} \text{ " } \\ 11\frac{7}{8} \text{ " } = 11\frac{8}{10} \text{ " } \\ 14\frac{3}{4} \text{ " } = 14\frac{7}{10} \text{ " } \\ \hline 67\frac{11}{10} \text{ A.} \end{array}$$

16.  $\frac{5}{7} + \frac{1}{2} = \frac{17}{14}$ .

17.  $\frac{2}{3} - \frac{5}{12} = \frac{1}{4}$ .

18.  $\$7 + \$1\frac{1}{2} = \$8\frac{1}{2}$ .

19.  $7\frac{5}{8} - 6\frac{3}{8} = 1\frac{2}{8}$ .

20.  $4\frac{2}{3} + 5\frac{1}{4} + 3\frac{5}{6} + 4\frac{7}{10} + 1\frac{1}{2} = 20\frac{1}{10}$ .

21.  $\$1\frac{1}{2} - \$\frac{1}{2} = \$1$ .

22.  $\frac{5}{8} + \frac{7}{8} + \frac{3}{8} = 1\frac{15}{8}$ .

23.  $\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$ .

24.  $\$10 - \$8\frac{3}{4} = \$1\frac{1}{4}$ .

25.  $\frac{1}{4} \text{ T.} + \frac{1}{8} \text{ T.} + \frac{1}{8} \text{ T.} = 2\frac{7}{8} \text{ T.}$

26.  $\frac{1}{4} - \frac{3}{4} = \frac{2}{4}$ .

27.  $\$1\frac{1}{2} - \$\frac{1}{2} = \$1$ .

28.  $23\frac{1}{2} \text{ mi.} - 14\frac{7}{8} \text{ mi.} = 8\frac{1}{4} \text{ mi.}$

29.  $32\frac{1}{2} - 1\frac{1}{2} = 31$ .

30.  $\frac{2}{3} + \frac{1}{3} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = 2\frac{2}{3}$ .

31.  $\frac{2}{3} \text{ cd.} + \frac{5}{12} \text{ cd.} + \frac{1}{6} \text{ cd.} + \frac{1}{6} \text{ cd.} = 1\frac{2}{3} \text{ cd.}$

32.  $\frac{1}{2} \text{ T.} - \frac{1}{8} \text{ T.} = \frac{3}{8} \text{ T.}$

33.  $27\frac{1}{10} - 7\frac{1}{10} = 20$ .

34.  $391\frac{1}{2} + 19\frac{1}{4} + 4\frac{7}{10} + 57\frac{1}{4} + \frac{1}{5} = 473\frac{3}{4}$ .

35.  $\frac{5}{4} - \frac{7}{4} = \frac{2}{4}$ .

36.  $\frac{2}{3} \text{ mi.} + \frac{1}{3} \text{ mi.} + \frac{1}{6} \text{ mi.} + \frac{1}{6} \text{ mi.} = 2\frac{2}{3} \text{ mi.}$

37.  $\frac{1}{2} + \frac{1}{2} = 1$ ;  $\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$ .

38.  $11\frac{2}{3} - 5\frac{1}{3} = 6$ . 39.  $1\frac{1}{2} \text{ ft.} - \frac{1}{10} \text{ ft.} = 1\frac{4}{5} \text{ ft.}$

40.  $13\frac{1}{2} \text{ T.} + 11\frac{1}{2} \text{ T.} + 9\frac{7}{8} \text{ T.} = 34\frac{1}{8} \text{ T.}$

## SECTION IV.

## MULTIPLICATION.

## CASE I.

## One Factor a Fraction.

1.  $\frac{2}{11} \times 8 = \frac{16}{11} = 2\frac{4}{11}$ .      2.  $\frac{7}{1} \times 13 = \frac{91}{1} = 91$ .  
 3.  $\$ \frac{5}{8} \times 7 = \$ \frac{35}{8} = \$4\frac{3}{8}$ .      4.  $18 \times \frac{7}{12} = \frac{126}{12} = 10\frac{1}{2}$ .  
 5.  $14 \text{ mi.} \times \frac{5}{6} = \frac{70}{6} \text{ mi.} = 11\frac{5}{3} \text{ mi.}$   
 6.  $19 \times \frac{4}{17} = \frac{76}{17}$ ;  $31 \times \frac{2}{11} = \frac{62}{11}$ ;  $\frac{2}{5} \times 34 = 13\frac{4}{5}$ .  
 7.  $\$ \frac{12}{10} \times 12 = \$7\frac{6}{5}$ .      8.  $\$5 \times \frac{3}{4} = \$3\frac{3}{4}$ .

## CASE II.

## Both Factors Fractions.

9.  $\frac{8}{8} \times \frac{7}{10} = \frac{7}{10}$ ;  $\frac{4}{8} \times \frac{13}{17} = \frac{16}{51}$ .  
 10.  $\frac{13}{10} \text{ mi.} \times \frac{9}{10} = \frac{27}{20} \text{ mi.}$   
 11.  $7\frac{4}{8} \times 4\frac{4}{9} = \frac{13}{8} \times \frac{40}{9} = \frac{104}{3} = 34\frac{2}{3}$ .  
 12.  
 $4\frac{5}{10} \times 6\frac{1}{11} = \frac{41}{10} \times \frac{67}{11} = \frac{2747}{110} = 25\frac{97}{110}$   
 $\frac{5}{21} \times 3\frac{4}{11} = \frac{5}{21} \times \frac{37}{11} = \frac{185}{231}$   
 $18\frac{4}{13} \times 9 = \frac{232}{13} \times \frac{9}{1} = \frac{2148}{13} = 164\frac{12}{13}$   
 13.  $\frac{13}{18} \times \frac{3}{17} = \frac{13}{102}$ .      14.  $\frac{5}{8} \times \frac{3}{8} \times \frac{4}{5} = \frac{1}{4}$ .  
 15.  $\frac{5}{8} \text{ bu.} \times 30 = 18\frac{3}{4} \text{ bu.}$       16.  $\$78 \times \frac{3}{4} = \$58\frac{1}{2}$ .  
 17.  $\frac{2}{3} \times \frac{5}{8} = \frac{5}{12}$ .      18.  $\$ \frac{17}{10} \times \frac{7}{8} = \$ \frac{119}{80}$ .  
 19.  $11\frac{1}{2} \times \frac{4}{7} = 9\frac{1}{7}$ .      20.  $9\frac{1}{2} \times 8 = 76\frac{1}{2}$ .  
 21.  $118 \text{ yd.} \times \frac{1}{10} = 11\frac{8}{10} \text{ yd.}$       22.  $43 \times \frac{5}{13} = 16\frac{7}{13}$ .

23.  $\frac{1}{2}$  da.  $\times 54 = 47\frac{1}{2}$  da.      24.  $\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} = \frac{8}{27}$ .  
 25.  $\$1\frac{1}{2} \times 4\frac{2}{3} = \$8\frac{1}{3}$ .      26.  $(15\frac{1}{2} \times 12\frac{1}{2}) = 198\frac{1}{4}$  sq. rd.  
 27.  $\$156 \times \frac{27}{2} = \$131\frac{1}{2}$ .      28.  $\frac{5}{12} \times \frac{2}{3} \times 1\frac{1}{2} = \frac{1}{2}$ .  
 29.  $1\frac{1}{2}$  bu.  $\times 17\frac{1}{2} = 33\frac{3}{4}$  bu.  
 30. 75 words  $\times 1\frac{1}{2} = 55$  words.  
 31.  $(\frac{1}{2})^4 = \frac{1}{16}$ ;  $(\frac{2}{3})^5 = \frac{32}{243}$ ;  $(\frac{3}{4})^6 = \frac{3^3 \cdot 5}{2^6}$ ;  $(\frac{4}{5})^7 = \frac{4^7}{5^7}$ .  
 32.  $\frac{2}{3} \times \frac{1}{2} \times \frac{2}{3}$  rm.  $= \frac{2}{9}$  rm.  
 33. 22 mi.  $\times 5\frac{3}{5} = 116\frac{2}{5}$  mi.  
 34.  $\frac{2}{3}$  da.  $\times 1\frac{7}{10} = 2\frac{14}{15}$  da.  
 35.  $(6\frac{1}{2})^3 = 244\frac{1}{8}$ ;  $(16\frac{2}{3})^2 = 277\frac{1}{3}$ .  
 36.  $\frac{2}{3}$  of  $\frac{3}{4}$  of  $\frac{1}{2} \times \frac{2}{3}$  of  $\frac{3}{4}$  of  $\frac{1}{2} = \frac{1}{8}$ .

## SECTION V.

## DIVISION.

## CASE I.

The Divisor an Integer.

1.  $\frac{7}{8} \div 5 = \frac{1}{5}$  of  $\frac{7}{8} = \frac{7}{40}$ ;  $\frac{16}{21} \div 12 = \frac{1}{12}$  of  $\frac{16}{21} = \frac{4}{63}$ .  
 2.  $\frac{40}{9} \div 15 = \frac{1}{15}$  of  $\frac{40}{9} = \frac{8}{27}$ .  
 3. 1 yr.  $\div 5 = \frac{1}{5}$  of 12 mo.  $= 2\frac{2}{5}$  mo.  
 4.  $\frac{33}{40}$  A.  $\div 6 = \frac{11}{40}$  A.  $\times \frac{1}{2} = \frac{11}{80}$  A.  
 5.  $13\frac{1}{2}$  rd.  $\div 3 = \frac{27}{2}$  rd.  $\times \frac{1}{3} = 4\frac{1}{2}$  rd.

## CASE II.

The Divisor a Fraction.

6.  $6 \div \frac{4}{7} = \frac{3}{1} \times \frac{7}{4} = 10\frac{1}{2}$ .      7.  $\frac{5}{8} \div \frac{3}{7} = \frac{5}{8} \times \frac{7}{3} = 1\frac{17}{24}$

$$8. 2\frac{1}{2} \div 2\frac{1}{2} = \frac{5}{2} \times \frac{2}{5} = 1\frac{1}{2}.$$

$$9. \$12 \div \$\frac{4}{5} = \frac{12}{1} \times \frac{5}{4} = 15 \text{ times} = 15 \text{ cwt.}$$

$$10. \$\frac{3}{5} \div \$\frac{2}{25} = \frac{3}{5} \times \frac{25}{2} = 7\frac{1}{2} \text{ times} = 7\frac{1}{2} \text{ qt.}$$

$$11. 5\frac{15}{32} \text{ A.} \div \frac{7}{8} \text{ A.} = \frac{165}{32} \times \frac{8}{7} = 6\frac{1}{4} \text{ times} = 6\frac{1}{4} \text{ da.}$$

$$12. 1 \div \frac{2}{3} = 1 \times \frac{3}{2} = \frac{3}{2}.$$

$$13. \frac{15}{16} \div 10 = \frac{3}{32}; \frac{3}{8} \div 16 = \frac{3}{128}.$$

$$14. \$4 \div \$\frac{7}{24} = 13\frac{1}{2} \text{ times} = 13\frac{1}{2} \text{ yd.}$$

$$15. 26 \div \frac{2}{3} = 39.$$

$$16. \frac{2}{5} \text{ lb.} \div 12 = \frac{1}{30} \text{ lb.}$$

$$17. \frac{2}{3} \div \frac{1}{12} = \frac{8}{3}; \frac{9}{10} \div \frac{2}{40} = 12.$$

$$18. \$\frac{21}{10} \div \$\frac{7}{8} = \frac{12}{5} \text{ times} = \frac{12}{5} \text{ lb.}$$

$$19. 13\frac{1}{2} \div 25 = \frac{1}{50}; 16\frac{1}{2} \div 9 = 1\frac{1}{2}.$$

$$20. 22\frac{1}{2} \text{ mi.} \div 35 = \frac{1}{4} \text{ mi.}$$

$$21. 7\frac{1}{2} \div \frac{2}{3} = 8\frac{1}{2}; 1\frac{1}{16} \div \frac{1}{8} = 1\frac{1}{2}.$$

$$22. \$\frac{17}{16} \div \frac{1}{16} = \$1\frac{1}{4}.$$

$$23. 234\frac{3}{4} \div 17 = 13\frac{1}{4}.$$

$$24. \frac{1\frac{1}{2}}{\frac{6}{5}} = \frac{15}{4} \times \frac{5}{6} = 10; \frac{45\frac{1}{2}}{\frac{3}{27}} = \frac{41\frac{1}{2}}{1} \times \frac{27}{3} = 15.$$

$$25. \frac{2}{15} \text{ bu.} \div 48 = \frac{1}{72} \text{ bu.}$$

$$26. \frac{2}{3} \div 3\frac{1}{3} = \frac{2}{15}.$$

$$27. 5\frac{1}{2} \text{ bu.} \div \frac{1}{12} \text{ bu.} = 63 \text{ times} = 63 \text{ sq. yd.}$$

$$28. 11\frac{1}{2} \div 3\frac{2}{3} = 3\frac{9}{7}; 16\frac{1}{2} \div 6\frac{1}{5} = 2\frac{7}{10}.$$

$$29. \$1\frac{2}{10} \div 12\frac{1}{2} = \$\frac{1}{5}.$$

$$30. \$11\frac{2}{10} \div \$1\frac{2}{5} = 8\frac{1}{2} \text{ times} = 8\frac{1}{2} \text{ gal.}$$

$$31. \frac{27}{8} \text{ oz.} \div 18 = \frac{3}{8} \text{ oz.}$$

$$32. 36 \text{ pp.} \div 6\frac{2}{3} = 5\frac{1}{2} \text{ pp.}$$

$$33. \$\frac{22}{5} \div 14\frac{2}{3} = \$\frac{3}{5} = \$0.6.$$

$$34. \$\frac{3}{5} \div \$5\frac{1}{5} = \frac{1}{5} \text{ time} = \frac{1}{5} \text{ bu.}$$

$$35. \$\frac{22}{10} \div 8\frac{2}{3} = \$\frac{3}{100} = \$0.09.$$

$$36. 1,811\frac{7}{10} \text{ ft.} \div 74\frac{1}{4} \text{ ft.} = 24\frac{3}{4} \text{ times} = 24\frac{3}{4} \text{ rd.}$$

$$37. \frac{\frac{7}{8} \text{ of } 2\frac{5}{8}}{\frac{5}{8} \text{ of } 8\frac{3}{4}} = \frac{7}{16} \times \frac{21}{8} \times \frac{8}{5} \times \frac{4}{8} = \frac{7}{5}.$$

38.

$$(18\frac{2}{3} \times \frac{1}{3}) 3\frac{1}{3} \text{ cu. ft. ; and}$$

$$2\frac{1}{3} \text{ cu. ft.} \div 8\frac{1}{3} \text{ cu. ft.} = \frac{2}{3} \text{ time} = \frac{2}{3} \text{ ft.}$$

## SECTION VI.

### REVIEW PROBLEMS IN FRACTIONS.

1.  $14 \text{ h.} \div \frac{1}{10} \text{ h.} = 140 \text{ times} = 140 \text{ mi.}$

2.  $3\frac{1}{2} + \frac{3}{11} + 17\frac{1}{2} + 6\frac{2}{3} = 28\frac{5}{66}.$

3.

$$\frac{1}{4} \text{ of } \$900 = \$225 = \frac{1}{15} \text{ of the cost ; and}$$

$$\$225 \times 15 = \$3,375, \text{ the cost.}$$

Or,

$$\$900 \div \frac{4}{15} = \$3,375.$$

4.  $\frac{7}{8} - \frac{3}{4} = \frac{1}{8}.$

5.  $\$2,156\frac{7}{10} \div 1,540\frac{1}{2} = \$1\frac{1}{2}.$

6.  $305 \text{ men} \div \frac{5}{17} = 1,037 \text{ men.}$

7.  $\frac{3}{10} + \frac{7}{15} + \frac{5}{6} = 1\frac{2}{3}.$

8.  $\frac{1}{20} \text{ A.} - (\frac{2}{25} \text{ A.} + \frac{1}{3} \text{ A.}) = \frac{23}{300} \text{ A.}$

9.  $\$423 \div \$22\frac{1}{2} = 18\frac{1}{2} \text{ times} = 18\frac{1}{2} \text{ mo.}$

10.  $\$7 \div \frac{1}{4} = \$3\frac{1}{2}.$

11.  $\frac{1}{2} \text{ oz.} + \frac{5}{8} \text{ oz.} + \frac{1}{4} \text{ oz.} = 1\frac{7}{8} \text{ oz.}$

12.  $11\frac{1}{11} - 10\frac{1}{10} = \frac{19}{110}.$

13.  $\frac{2}{10} \text{ of } \frac{5}{8} \text{ of } \frac{1}{4} \text{ of } 15\frac{3}{4} = 5\frac{1}{8}.$

14.  $\$20\frac{1}{4} \div \frac{2}{10} = \$22\frac{1}{2}.$

15.  $3\frac{1}{2} + \frac{2}{3} + 2\frac{2}{10} + 1\frac{1}{2} = 9\frac{2}{3}.$

16.  $\frac{7}{12} \text{ of } 2\frac{1}{2} \div \frac{5}{8} \text{ of } 8\frac{3}{4} = \frac{7}{25}.$

17.  $\frac{1}{12} \text{ mi.} + \frac{2}{10} \text{ mi.} + \frac{2}{10} \text{ mi.} + \frac{1}{2} \text{ mi.} = 2\frac{1}{6} \text{ mi.}$

18.  $\frac{1}{2} - \frac{3}{7} = \frac{1}{14}.$

19.  $\$1\frac{2}{10} \times 15 = \$21\frac{3}{5} = \$21.7.$

20.  $1\frac{1}{10} - \frac{4}{5} = \frac{1}{10}.$

21.  $\$536\frac{1}{2} \div 1\frac{1}{2} = \$296\frac{1}{3}.$

22.  $\frac{7}{15} \times \frac{4}{7} \times \frac{1}{12} \times 3\frac{1}{2} \times 4\frac{2}{3} = \frac{11}{15}.$

23.

Copper,  $\frac{37}{100} \text{ T.} \times \frac{1}{2} = \frac{37}{200} \text{ T. ;}$

Tin,  $\frac{37}{100} \text{ T.} \times \frac{1}{3} = \frac{37}{300} \text{ T.}$



$$24. \frac{5}{17} \times \frac{2}{17} = \frac{2}{119}; \frac{12}{17} \times \frac{15}{17} = \frac{27}{119}; \frac{1}{17} \times \frac{11}{17} = \frac{1}{119};$$

$$\frac{22}{17} \times \frac{122}{17} = \frac{2684}{289}.$$

$$25. 4\frac{7}{10} \div 11\frac{3}{4} \times 19\frac{1}{2} = \$7\frac{1}{2}.$$

$$26. \$1\frac{2}{10} \times 35 \times 19\frac{1}{2} = \$887\frac{1}{2}.$$

$$27. \$\frac{1}{2} \times 290\frac{5}{8} \div \$\frac{5}{8} = 93 \text{ times} = 93 \text{ loads.}$$

28.

$$\frac{23\frac{1}{2} \text{ sq. yd.} \times 1\frac{1}{2}}{\frac{7}{8} \text{ sq. yd.}} = 33\frac{1}{2} \text{ times} = 33\frac{1}{2} \text{ yd.}$$

$$29. \$56.50 - \$25 = \$31.50; \$31.50 \div 6 = \$5.25.$$

# CHAPTER VI.

## CONVERSE OPERATIONS.

### SECTION I.

#### *CONVERSE OPERATIONS IN THE DIFFERENT CLASSES OF NUMBERS.*

#### CASE I.

**Converse Operations in the Fundamental Rules.**

1.  $219.5 - 96.875 = 122.625$ .
2.  $27\frac{3}{4} + 16\frac{7}{8} = 44\frac{13}{8}$ .
3. 1 mi. - 4 rd. 7 ft. = 815 rd. 9 ft. 6 in.
4.  $298 - (47.5 + 5.95) = 244.55$ .
5.  $43\frac{1}{2} - (17\frac{1}{4} + \frac{3}{4}) = 25\frac{5}{8}$ .
6.  $.25 \times .844 = .086$ .
7.  $3,402 \div (9 \times 27) = 14$ .
8.  $19\frac{1}{2} \div (1\frac{1}{2} \times 2\frac{5}{8}) = 5\frac{1}{4}$ .
9.  $\frac{1765 + 225}{2} = 1,000$ .

10.

$\frac{1}{2}$  of  $(71\frac{3}{8} + 16\frac{7}{8}) = 44\frac{13}{8}$ , the greater number; and  
 $\frac{1}{2}$  of  $(71\frac{3}{8} - 16\frac{7}{8}) = 27\frac{3}{4}$ , the less number.

#### CASE II.

**Multiplication and Division by Factors of Composite Numbers.**

11.  $24 = 4 \times 6$ ; and  $293 \times 4 \times 6 = 7,032$ .

12.

$35 = 7 \times 5$ ; and

$41.25 \times 7 \times 5 = 1443.75 = 1443.75 \text{ sq. rd.}$

13.  $4.5 = .5 \times 9$ ; and  $\$1.93\frac{3}{4} \times .5 \times 9 = \$8.71\frac{1}{4}$ .

14.

$72 = 8 \times 9$ ;

$3,124 \div 8 = 265.5$ ; and

$265.5 \div 9 = 29.5$ .

15.

$$54 = 6 \times 9;$$

$$\$202.50 \div 6 = \$33.75; \text{ and}$$

$$\$33.75 \div 9 = \$3.75.$$

16.

$$28 = 4 \times 7$$

$$88 \text{ bu. 2 pk.} \div 4 = 9 \text{ bu. 2 pk. 4 qt.}; \text{ and}$$

$$9 \text{ bu. 2 pk. 4 qt.} \div 7 = 1 \text{ bu. 1 pk. 4 qt.}$$

17.

$$.49 = 7 \times 7; \text{ and}$$

$$13\frac{3}{4} \text{ A.} \times 7 \times 7 = 678\frac{3}{4} \text{ A.}$$

18.

$$6.4 = 8 \times .8;$$

$$\$112 \div 8 = \$14; \text{ and}$$

$$\$14 \div .8 = \$17.50, \text{ cost of 1 T.};$$

$$.81 = .9 \times .9; \text{ and}$$

$$\$17.50 \times .9 \times .9 = \$14.175.$$

## CASE III.

## Multiplication and Division by Aliquot Parts.

19.

$$1\frac{1}{4} = \frac{1}{8} \text{ of } 10;$$

$$364 \times 10 = 3,640; \text{ and}$$

$$3,640 \div 8 = 455.$$

20.

$$1\frac{1}{4} = \frac{1}{8} \text{ of } 10;$$

$$455 \div 10 = 45.5; \text{ and}$$

$$45.5 \times 8 = 364.$$

21.

$$12\frac{1}{2} \text{ bu.} = \frac{1}{8} \text{ of } 100 \text{ bu.};$$

$$\$3.42 \times 100 = \$342; \text{ and}$$

$$\$342 \div 8 = \$42.75.$$

22.

$$12\frac{1}{2} \text{ bu.} = \frac{1}{8} \text{ of } 100 \text{ bu.};$$

$$\$42.75 \div 100 = \$.4275; \text{ and}$$

$$$.4275 \times 8 = \$3.42.$$

23.

$$333\frac{1}{3} = \frac{1}{3} \text{ of } 1,000;$$

$$198 \times 1,000 = 198,000; \text{ and}$$

$$198,000 \div 3 = 66,000.$$

24.

$$333\frac{1}{3} = \frac{1}{3} \text{ of } 1,000;$$

$$66,000 \div 1,000 = 66; \text{ and}$$

$$66 \times 3 = 198.$$

25.

$$83\frac{1}{3} = \frac{1}{12} \text{ of } 1,000;$$

$$\$92 \times 1,000 = \$92,000; \text{ and}$$

$$\$92,000 \div 12 = \$7,666.66\frac{2}{3}.$$

26.

$$\begin{aligned} 83\frac{1}{2} &= \frac{1}{12} \text{ of } 1,000; \\ \$7,666.66\frac{2}{3} \div 1,000 &= \$7.66\frac{2}{3}; \text{ and} \\ \$7.66\frac{2}{3} \times 12 &= \$92. \end{aligned}$$

27.

$$\begin{aligned} 16\frac{2}{3} &= \frac{1}{6} \text{ of } 100; \\ 7.14 \times 100 &= 714; \text{ and} \\ 714 \div 6 &= 119. \end{aligned}$$

28.

$$\begin{aligned} 16\frac{2}{3} &= \frac{1}{6} \text{ of } 100; \\ 119 \div 100 &= 1.19; \text{ and} \\ 1.19 \times 6 &= 7.14. \end{aligned}$$

29.

$$\begin{aligned} \$83\frac{1}{3} &= \frac{1}{3} \text{ of } \$1.00; \\ \$19.50 \div \$1.00 &= 19.5; \text{ and} \\ 19.5 \times 3 &= 58.5 = 58.5 \text{ bu.} \end{aligned}$$

30.

$$\begin{aligned} \$0.61 &= \$\frac{1}{16}; \text{ and} \\ 144 \div 16 &= 9 \text{ times} = \$9. \end{aligned}$$

31.

$$\begin{aligned} \$.25 &= \$\frac{1}{4}; \text{ and} \\ 37.75 \div 4 &= 9.43\frac{3}{4} \text{ times} = \$9.43\frac{3}{4}. \end{aligned}$$

32.

$$\begin{aligned} \$1.12\frac{1}{2} &= \$1\frac{1}{4} \\ 376 \text{ bu. @ } \$1 &= \$376 \\ 376 \text{ " " } \$\frac{1}{4} &= \underline{47} \\ 376 \text{ " " } \$1\frac{1}{4} &= \$423 \end{aligned}$$

$$33. 625 \times \$\frac{7}{8} = \$\frac{1275}{4} = \$468.75.$$

$$34. 250 \text{ lb.} = \frac{1}{8} \text{ T. and } \$65 \div 8 = \$8.12\frac{1}{2}.$$

35.

$$\begin{aligned} 83\frac{1}{2} \text{ rd.} &= 66\frac{2}{3} \text{ rd.} + \frac{1}{4} \text{ of } 66\frac{2}{3} \text{ rd.} = \frac{5}{4} \text{ of } 66\frac{2}{3} \text{ rd.} \\ 66\frac{2}{3} \text{ rd.} &\text{ cost } \$483 \\ \frac{1}{4} \text{ of } 66\frac{2}{3} \text{ rd.} &\text{ " } \underline{120.75} \\ 83\frac{1}{2} \text{ rd.} &\text{ " } \$603.75 \end{aligned}$$

36.

$$\begin{aligned} (8 \times 4) &= 32 \text{ sq. rd.} = \frac{1}{4} \text{ A.; and} \\ 5 \times 23 \text{ bu.} &= 115 \text{ bu.} \end{aligned}$$

## SECTION II.

## CONVERSE REDUCTIONS.

## CASE I.

Decimals to Fractions, and Fractions to Decimals.

1.  $\frac{275}{1000} = \frac{75}{200} = \frac{15}{40} = \frac{3}{8}$ .

$$\begin{array}{r} 2. \\ 3 \overline{) 8} \\ \underline{.375} \end{array}$$

3.  $.16\frac{2}{3} = \frac{16\frac{2}{3}}{100} = \frac{50}{300} = \frac{1}{6}$

4.  $\frac{1}{6} = .16\frac{2}{3}$ .

5, 6.  $6.75 = 6\frac{3}{4}$ .

7, 8.  $.00004 \text{ mi.} = \frac{1}{25000} \text{ mi.}$

9.  $\frac{2}{100} \text{ T.} = .01875 \text{ T.}$

10.  $2\frac{3}{4} \text{ da.} = \frac{11}{4} \text{ da.}$

11.  $.06875 = \frac{11}{160}$ .

12.  $7\frac{3}{4} = 7.75$ .

13.  $.85 \text{ cd.} = \frac{17}{20} \text{ cd.}$

14.  $\frac{5}{18} = .27\frac{7}{9}$ , or  $.27\frac{7}{9}$ , or  $.27\frac{7}{9}$ .

## CASE II.

Denominate Decimals to Compound Numbers, and  
Compound Numbers to Denominate Decimals.

15.

.8 lb.

12

9.6 oz.

20

12.0 pwt.

Hence, .8 lb. = 9 oz. 12 pwt.

16.

12 pwt. 1209.6 oz. 12

.8 lb.

Hence, 9 oz. 12 pwt. = .8 lb.

17, 18.  $.21675 \text{ T.} = 4 \text{ cwt. } 33 \text{ lb. } 8 \text{ oz.}$

19, 20.  $.26 \text{ bu.} = 1 \text{ pk. } .64 \text{ pt.}$

21.

The year 1875 will be a common year; and  
.75 of a common year = 273 da. 18 h.

22.

15 h. 50 min. 24 sec. = .66 of 24 h.;  
Hence, .66 of a diurnal revolution.

23. .85 bu. = 3 pk. 3 qt. .4 pt.  
24. 2 yd. 2 ft. 3 in. = .5 rd.  
25. 4 da. 4 h. 48 min. = .6 wk.  
26. .45 cd. = 3 cd. ft. 9.6 cu. ft.

### CASE III.

**Denominate Fractions to Compound Numbers, and  
Compound Numbers to Denominate Fractions.**

- 27, 28.  $\$ \frac{5}{16}$  = 31 cents 2.5 mills.  
29, 30.  $\frac{3}{16}$  rm. = 10 quires 16 sheets.  
31, 32.  $\pounds \frac{1}{16}$  = 10s. 7d. 2 far.  
33, 34.  $\frac{3}{8}$  sq. mi. = 426 A. 106 sq. rd. 20 sq. yd. 1 sq. ft. 72 sq. in.  
35. 3 pk.  $\frac{1}{2}$  pt. =  $\frac{27}{128}$  bu.      36.  $\frac{1}{16}$  T. = 18 cwt.  $33\frac{1}{8}$  lb.

37.

Since 11 forks weigh 1 lb., 1 fork weighs  $\frac{1}{11}$  lb., and 6 forks weigh  $\frac{6}{11}$  lb.

$\frac{6}{11}$  lb. = 6 oz. 10 pwt.  $21\frac{9}{11}$  gr.

38. 60 gal. 2 gi. =  $\frac{261}{1000}$  hhd.

39.

219 da. 14 h. 24 min. =  $219\frac{3}{4}$  da.; a leap-year is 366 da.; and

$\frac{219\frac{3}{4}}{366}$  da. =  $\frac{3}{4}$  time =  $\frac{3}{4}$  yr.

40.

$\frac{1}{2}$  oz. Apothecaries' weight = 240 gr.; and  
240 gr.  $\div$  12 gr. = 20 times = 20 powders.

## SECTION III.

*PRICE, QUANTITY, AND COST.*

## CASE I.

Price and Quantity given, to find Cost.

1.  $183.76 \times \$56.25 = \$10,386.50.$

2.  $\$4.50 \times \frac{1}{4} = \$2.81\frac{1}{4}.$

3.

$385 \text{ lb.} = 3.85 \text{ cwt.}; \text{ and}$

$\$11.50 \times 3.85 = \$44.27\frac{1}{2}.$

4.

$15,650 \text{ brick} = 15.65 \text{ thousand brick}; \text{ and}$

$\$9.50 \times 15.65 = \$148.67\frac{1}{2}.$

5.

$4,680 \text{ lb.} = 2.34 \text{ T.}; \text{ and}$

$\$3.50 \times 2.34 = \$8.19.$

6.  $\$6.65.$

7.

$40\frac{1}{4} \text{ yd., @ } \$ .16 = \$ 6.44$

$13 \text{ " " } .15 = 1.95$

$2\frac{1}{4} \text{ " " } 5.25 = 11.81\frac{1}{4}$

$9 \text{ " " } 1.44 = 12.96$

$1\frac{3}{4} \text{ doz., " } .40 = .66\frac{3}{4}$

$\text{Twist, 5c., cotton 10c.} = \underline{.15}$

$\$38.98$

## CASE II.

Price and Cost given, to find Quantity.

8.  $\$10,386.50 \div \$56.25 = 183.76.$  Hence, 183.76 A.

9.  $\$27.5625 \div \$8.75 = 3.15.$  Hence, 31.5 gal.

10.  $\$48.47 \div \$9.25 = 5.24.$  Hence, 5.24 T., or 5 T. 480 lb.

11.  $\$44.27\frac{1}{2} \div 3.85 = \$11.50.$

12.  $\$148.67\frac{1}{2} \div \$9.50 = 15.65 \text{ times} = 15.65 \text{ thousand brick} = 15,650 \text{ brick.}$

13.  $\$8.19 \div \$3.50 = 2.34 \text{ times} = 2.34 \text{ T.} = 4,680 \text{ lb.}$

## CASE III.

Quantity and Cost given, to find Price.

14.  $\$10,336.50 \div 183.76 = \$56.25.$

15.  $\$2.81\frac{1}{2} \div \frac{1}{2} = \$4.50.$

16.  $\$44.27\frac{1}{2} \div \$11.50 = 3.85 \text{ times} = 3.85 \text{ cwt., or } 385 \text{ lb.}$

17.

15,650 brick = 15.65 thousand brick; and

$\$148.67\frac{1}{2} \div 15.65 = \$9.50.$

18.

4,680 lb. = 2.34 T.; and

$\$8.19 \div 2.34 \div \$3.50.$

19.

3 lb. 8 oz. =  $3\frac{1}{2}$  lb.; and

$\$4.75 \times 3\frac{1}{2} = \$16.62\frac{1}{2}.$

20.  $\$16.62\frac{1}{2} \div \$4.75 = 3.5 \text{ times} = 3.5 \text{ lb.} = 3 \text{ lb. } 8 \text{ oz.}$

21.

3 lb. 8 oz. =  $3\frac{1}{2}$  lb.; and

$\$16.62\frac{1}{2} \div 3\frac{1}{2} = \$4.75.$

22.

765 = 7.65 C.; and

$\$1.12\frac{1}{2} \times 7.65 = \$8.60\frac{1}{2}.$

23.  $\$2.81\frac{1}{2} \div \$4.50 = \frac{1}{2} \text{ time} = \frac{1}{2} \text{ yd.}$

24.

13,450 = 13.45 M.; and

$13.45 \times \$7.50 = \$100.87\frac{1}{2}.$

25.

3,575 lb. = 1.7875 T.; and

$\$12.50 \times 1.7875 = \$22.34\frac{3}{4}.$

26.  $\$22.34\frac{3}{4} \div 12.50 = 1.7875 \text{ times} = 1.7875 \text{ T.} = 3,575 \text{ lb.}$

27.

3,575 lb. = 1.7875 T.; and

$\$22.34\frac{3}{4} \div 1.7875 = \$12.50.$

28.

$(28 \times 24 \times 8 =) 5,376 \text{ cu. ft.} = 199\frac{1}{2} \text{ cu. yd.}$

$\$.66\frac{2}{3} = \$.66\frac{2}{3}, \text{ and } 199\frac{1}{2} \times \$.66\frac{2}{3} = \$132.74.$



29.  $\$2.8125 \div \$3.75 = .75 = \frac{3}{4}$  time. Hence,  $\frac{3}{4}$  cd.

30.  $\$61.68\frac{1}{2} \div 27\frac{5}{8} = \$2.25$ .

31.

10,675 = 106.75 C.; and  
 $\$196.42 \div 106.75 = \$1.84$ .

32.

6,720 lb. = 3.36 T.; and  
 $\$18 \times 3.36 = \$60.48$ .

33.

5 mi. 235.2 rd. = 5.785 mi.; and  
 $\$12,473.62\frac{1}{2} \div 5.785 = \$2,175$ .

34.  $\$250.04 \div \$4.75 = 52.64$  times = 52.64 thousand feet.

35.

1,480 lb. = .74 T.; and  
 $\$46.25 \div .74 = \$62.50$ .

36. 10s. 4d.  $\times 59.5 = £30$  14s. 10d.

37.

$252 \times 1,080$  ems = 272,160 ems;  $272,160 = 272.16$  M.; and  
 $\$170.10 \div 272.16 = \$62\frac{1}{2}$ .

38.  $\$258 \div \$24 = 10.75$  times. Hence, 10.75 M.

## SECTION IV.

*A N A L Y S I S.*

1.

21 rd.  $\div 6 = 2\frac{1}{2}$  rd., 1 man lays in 1 day; and  
 $2\frac{1}{2}$  "  $\times 9 = 31.5$  " 9 men lay " 1 "

2.

31.5 rd.  $\div 9 = 21\frac{1}{2}$  rd., 1 man lays in 1 day; and  
 $21\frac{1}{2}$  "  $\times 6 = 21$  " 6 men lay " 1 "

3.

21 rd.  $\div 6 = 2\frac{1}{2}$  rd., 1 man lays in 1 day; and  
 $31.5$  rd.  $\div 2\frac{1}{2}$  rd. = 9 times. Hence, 9 men.

4.

$31\frac{1}{2}$  rd.  $\div$  9 =  $3\frac{1}{2}$  rd., 1 man. lays in 1 day; and  
 $21$  rd.  $\div$   $3\frac{1}{2}$  rd. = 6 times. Hence, 6 men.

5.

$\$5 \div \frac{2}{3} = \$7\frac{1}{2}$ , cost of 1 yd.; and  
 $\$7\frac{1}{2} \times \frac{7}{8} = \$5.83\frac{1}{8}$ , cost of  $\frac{7}{8}$  yd.

6.

1,745 lb. = .8725 T.  
 $\$13.75 \div \frac{1}{8} = \$22$  cost of 1 T.; and  
 $\$22 \times .8725 = \$19.19\frac{1}{2}$ , " " .8725 T.

7.

$20 \times 12$  days = 240 days, time in which 1 man can do the work.  
 $240$  days  $\div$  15 = 16 " " " " 15 " " " "  
 $16$  days  $\times$   $3\frac{1}{2}$  =  $53\frac{1}{2}$  " " " " 15 " " " "  
3 $\frac{1}{2}$  times  
[as much.]

8.

2 lb. 10 oz. =  $2\frac{5}{8}$  lb.  
 $(2\frac{1}{2} \times 1\frac{1}{2}) = \frac{9}{4}$  sq. yd.  
 $(150 \times 1\frac{3}{4}) = 262\frac{1}{2}$  sq. yd.  
 $2\frac{5}{8}$  lb.  $\div$   $\frac{1}{4}$  =  $\frac{5}{2}$  lb. wool to make 1 sq. yd.; and  
 $\frac{5}{2}$  lb.  $\times$   $262\frac{1}{2}$  = 216.176 lb. " " 262 $\frac{1}{2}$  " "

## SECTION V. 226

### LONGITUDE AND TIME.

1.

55 min. 44 sec., diff. in time.

15

13° 56', diff. in longitude.

2.

13° 56', diff. in longitude. | 15

55 min. 44 sec., diff. in time.

3.

1 h. 20 min. 24 sec., diff. in time.

15

20° 6', diff. in longitude.

4.

90° 25'

70 19

20° 6', diff. in longitude. ( 15

1 h. 20 min. 24 sec., diff. in time.

5.

1 h. 2 min. 52 sec., diff. in time.

15

15° 43', diff. in longitude.

77° 27', longitude of Richmond.

15 43, diff. in longitude.

98° 10', longitude of St. Paul.

6.

93° 10' W.

77 27 W.

15° 43', diff. in longitude. ( 15

1 h. 2 min. 52 sec., diff. in time.

7.

5° 54'

E., long. of St. Helena.

77 8

30'' W., long. of Washington.

82° 57'

30'', diff. in longitude. ( 15

5 h. 31 min. 50 sec., diff. in time.

8.

Time at Quito,

1 h. P.M.

" " Sacramento,

10 " 7 min. 20 sec. A.M.

Difference in time,

2 h. 53 min. 40 sec.

15

" " longitude,

43° 50'

Longitude of Quito,

78 50

" " Sacramento, 122°

SECTION VI.

226

REVIEW PROBLEMS IN CONVERSE  
OPERATIONS.

1.  $55\frac{1}{2}$  (the product)  $\div 4\frac{2}{3}$  (the multiplier) =  $12\frac{2}{3}$  (the multiplicand).

2.  $259 \text{ lb.} \div 56 = 4\frac{1}{2} \text{ lb.}$

3.

10 in. + 8 in. = 18 in. required for each stair.

$17 \times 18 \text{ in.} = 8\frac{1}{2} \text{ yd.}$  " " 17 stairs,

4.  $.06875 = \frac{11}{160000} = \frac{11}{160000}$ .

5.  $18\frac{2}{3} \text{ sq. rd.} = \frac{18\frac{2}{3}}{160} \text{ A.} = .115 \text{ A.}$

6.  $\$37.18\frac{2}{3} \div \$85 = .4375 \text{ time} = .4375 \text{ T.} = 875 \text{ lb.}$

7.  $.00\frac{1}{2} \text{ mi.} = 1\frac{1}{16} \text{ rd.} = 211\frac{1}{2} \text{ in., or } 211.2 \text{ in.}$

8.

23 bu. 2 pk. 5 qt. =  $23\frac{2}{3}\frac{1}{2}$  bu.; and

$\$6.50 \times 23\frac{2}{3}\frac{1}{2} = \$153.77.$

9.  $\$575 - (\$175 + \$125 + \$140) = \$135.$

10.

$1\frac{1}{2} \text{ mi.} = 3,080 \text{ yd., } 6 \text{ ft.} = 2 \text{ yd., and } 10 \text{ ft.} = 3\frac{1}{3} \text{ yd.}$

$(3,080 \times 2 \times 3\frac{1}{3}) = 20,533 \text{ cu. yd.; and}$

$\$4,812 \div 20,533 = \$21.$

11.

$1,463 \text{ lb.} + 1,521 \text{ lb.} + 1,584 \text{ lb.} = 4,568 \text{ lb.} = 45.68 \text{ cwt.;}$

and  $\$5.75 \times 45.68 = \$262.66.$

12.

$6 \times 15 \text{ lb.} = 90 \text{ lb. per wk.;}$

$24 \times 90 \text{ lb.} = 2,160 \text{ lb.} = 21.6 \text{ cwt. for } 24 \text{ wk.; and}$

$\$8.10 \div 21.6 = \$37\frac{1}{2}, \text{ price per C.}$

13.

$4\frac{2}{3} \times 1.25 \times \frac{1}{3} \times 2 = \frac{7}{3}$ , the product of four factors; and  
 $18$  (the product of five factors)  $\div \frac{7}{3} = 5\frac{4}{7}$ , the other factor.

14.

3,896 lb. = 1.948 T.; and  
 $\$170.45 \div 1.948 = \$87.50$ .

15.

23° 44' E.	97° 26' 15	
73 42 W.	6 h. 29 min. 44 sec.,	diff. in time.
97° 26', diff. in	3 20	P.M., time at Albany.
longitude.	9 h. 49 min. 44 sec. P.M.,	" " Athens.

16.

72.4 A. = 11,584 sq. rd.; and  
 $11,584 \text{ sq. rd.} \div 90.5 \text{ sq. rd.} = 128 \text{ times} = 128 \text{ rd.}$

17.

5 h. 12 min. = 5.2 h.; and  
 $117 \text{ mi.} \div 5.2 = 22.5 \text{ mi.}$

18.

2,240 lb. (1 long ton) - 2,000 lb. (1 short ton) = 240 lb., gain  
 on 1 long ton.  
 $417 \times 240 \text{ lb.} = 100,080 \text{ lb.} = 50.04 \text{ short tons, gain on 417}$   
 long tons.  
 $417 \text{ T.} + 50.04 \text{ T.} = 467.04 \text{ T.}$   
 $467.04 \text{ T.} @ \$5.75, \text{ sold for } \$2,685.48$   
 $417 \text{ " " } 4.65, \text{ cost } 1,939.05$   
 Gain, \$746.43

19.  $\$112.50 \div \$60 = 1.875 \text{ times} = 1,875 \text{ ft.}$

20.  $\frac{9}{16} = 9 \div 16 = .5625$ .

21.

$360^\circ \times .024\frac{1}{2} = 8.7^\circ$ ; and  
 $8.7 \times 69.16 \text{ mi.} = 601.692 \text{ mi.}$

22.

$$44 \text{ lb. } 11 \text{ oz.} = 44\frac{11}{16} \text{ lb.} = 7\frac{11}{16} \text{ lb.}$$

$$7\frac{11}{16} \text{ lb.} = 7\frac{11}{16} \text{ cwt.} = 7\frac{11}{16} \text{ cwt.}$$

$$17 \text{ cwt.} + 7\frac{11}{16} \text{ cwt.} = 24\frac{11}{16} \text{ cwt.}; \text{ and}$$

$$24\frac{11}{16} \text{ cwt.} = 24\frac{11}{16} \text{ T.}$$

23.

$$45 \text{ bu. @ } \$8.7\frac{1}{2} = \$39.37\frac{1}{2}, \text{ value of potatoes returned.}$$

$$45 \text{ " " } .56\frac{1}{4} = 25.31\frac{1}{4}, \text{ " " " borrowed.}$$

$$\underline{\$14.06\frac{1}{4}}, \text{ loss.}$$

24.

$$13 \text{ ft.} = 156 \text{ in., and } 19 \text{ ft. } 6 \text{ in.} = 234 \text{ in.}$$

$$(156 \times 234 =) 36,504 \text{ sq. in.} \div 26 \text{ sq. in.} = 1,404 \text{ times} = 1,404 \text{ in.}$$

$$1,404 \text{ in.} = 39 \text{ yd.}; \text{ and}$$

$$39 \text{ yd. @ } \$1.87\frac{1}{2} = \$73.12\frac{1}{2}.$$

25.

$$\frac{1}{16} \text{ of } 2,000 \text{ lb.} = 3.2 \text{ lb.}$$

$$3.2 \text{ lb. avoirdupois} = 3 \text{ lb. } 10 \text{ oz. } 13 \text{ pwt. } 8 \text{ gr. Troy.}$$

26.

$$2,750 \text{ ft.; @ } \$22 \text{ per M., } \$ 60.50$$

$$1,325 \text{ " " } 18 \text{ " " } 23.85$$

$$5,450 \text{ " " } 50 \text{ " " } 272.50$$

$$1,645 \text{ " " } 36 \text{ " " } 59.22$$

$$987 \text{ " " } 30 \text{ " " } 29.61$$

$$\underline{\$445.68}$$

27.

$$89^{\circ} 45' \text{ W., longitude of New Orleans.}$$

$$69^{\circ} 51' \text{ " " " Augusta.}$$

$$19^{\circ} 54', \text{ difference in longitude.}$$

$$19^{\circ} 54' = 1 \text{ h. } 19 \text{ min. } 36 \text{ sec, difference in time.}$$

$$\text{Hence, his watch is } 1 \text{ h. } 19 \text{ min. } 36 \text{ sec. too slow.}$$

28.

$$\$1.16\frac{2}{3} = \$1\frac{1}{3};$$

$$36 \text{ yd. @ } \$1\frac{1}{3} = \$3, \text{ cost of 1 piece.}$$

$$9 \text{ ps. " } \$6 = \$54.$$

29.

$$$.08\frac{1}{2} = \$\frac{1}{12}; \text{ and}$$

$$112 \text{ lb. @ } \$\frac{1}{12} = \$9.33\frac{1}{3}.$$

30.

$$\text{Gross weight of 5 loads,} \quad = 15,792 \text{ lb.}$$

$$5 \text{ times the weight of the wagon} = \underline{5,710} \text{ "}$$

$$\text{Weight of hay, } 10,082 \text{ lb.} = 5.041 \text{ T.}$$

$$\text{And } 5.041 \text{ T. @ } \$16.50 = \$83.1765.$$

$$31. \$85.78 \div \$127.65 = .672 \text{ time} = .672 \text{ T.} = 1,344 \text{ lb.}$$

32.

$$(8 \times 5 \times 6 =) 240 \text{ cu. ft.} \times 1\frac{1}{2} = 360 \text{ cu. ft., cubic contents of required bin.}$$

$$(9 \times 5\frac{1}{2} =) 49.5 \text{ cu. ft., cubic contents of 1 ft. wide of required bin.}$$

$$360 \text{ cu. ft.} \div 49.5 \text{ cu. ft.} = 7\frac{2}{11} \text{ times} = 7\frac{2}{11} \text{ ft., width of required bin.}$$

# CHAPTER VII.

## PERCENTAGE.

### SECTION I.

#### *DEFINITIONS AND NOTATION.*

#### *EXERCISES.*

1. 6 per cent, 17 per cent, 39 per cent, 112 per cent.
2. 21 per cent,  $12\frac{1}{2}$  per cent,  $6\frac{1}{4}$  per cent,  $\frac{1}{8}$  per cent.
3.  $7\frac{1}{2}$  per cent,  $31\frac{3}{4}$  per cent,  $\frac{5}{8}$  per cent,  $\frac{3}{4}$  per cent,  $\frac{7}{10}$  per cent.
4. .07 or  $\frac{7}{100}$ ; .19 or  $\frac{19}{100}$ ; .84 or  $\frac{84}{100} = \frac{21}{25}$ ; .48 or  $\frac{48}{100} = \frac{12}{25}$ ; .92 or  $\frac{92}{100} = \frac{23}{25}$ .
5. .22 or  $\frac{22}{100} = \frac{11}{50}$ ; .565 or  $\frac{565}{1000} = \frac{113}{200}$ ; .03 or  $\frac{3}{100} = \frac{3}{100}$ ; .0575 or  $\frac{575}{10000} = \frac{23}{400}$ ; .10625 or  $\frac{10625}{100000} = \frac{17}{160}$ .
6. .368 or  $\frac{368}{1000} = \frac{46}{125}$ ; 1.25 or  $\frac{125}{100} = \frac{5}{4}$ ; .00625 or  $\frac{625}{100000} = \frac{1}{160}$ ; .0116 or  $\frac{116}{10000}$ ; .010625 or  $\frac{10625}{1000000} = \frac{17}{16000}$ ;  $3.12\frac{1}{2} = \frac{25}{8}$ .
7. Amount, 1.06, 1.07; difference,  $1 - .06 = .94$ , and  $1 - .07 = .93$ .
8. Amount, 1.25 or  $\frac{5}{4}$ ; difference,  $1 - .25 = .75$  or  $\frac{3}{4}$ .



## SECTION II.

THE FIVE GENERAL CASES OF  
PERCENTAGE.

## CASE I.

Base and Rate given, to find Percentage.

1.  $20\% = \frac{1}{5}$ ; and  
 $960 \text{ bu.} \times \frac{1}{5} = 192 \text{ bu.}$
2.  $12\frac{1}{2}\% = \frac{1}{8}$ ; and  
 $2,548 \text{ ft.} \times \frac{1}{8} = 318.5 \text{ ft.}$
3.  $33\frac{1}{3}\% = \frac{1}{3}$ ; and  
 $12,837 \times \frac{1}{3} = 4,279.$
4.  $10\% = .10$ ; and  
 $7.5 \text{ oz.} \times .10 = .75 \text{ oz.}$
5.  
 $45 \text{ panes} \times 8 = 360 \text{ panes; and}$   
 $360 \text{ " } \times .075 = 27 \text{ "}$
6.  $540 \text{ bu.} \times 1.05 = 567 \text{ bu.}$
7.  $125 \text{ gal.} \times .02 = 2\frac{1}{2} \text{ gal.}$
8.  $5,000 \text{ cd.} \times .004 = 28\frac{1}{2} \text{ cd.}$
9.  $275 \text{ lb.} \times .11 = 30\frac{1}{2} \text{ lb.}$

## CASE II.

Base and Percentage given, to find Rate.

10.  $50 \text{ bu.} \div 5,000 \text{ bu.} = .01 = 1\%.$
11.  $\frac{1}{3} = \frac{1}{3} = .33\frac{1}{3} = 33\frac{1}{3}\%.$
12.  $\frac{2}{5} = \frac{2}{5} = .40 = 40\%.$
13.  $\frac{8}{10} = \frac{8}{10} = .85 = 85\%.$
14.  $\frac{13}{100} = \frac{13}{100} = .13 = 13\%.$
15.  
 $2,500 \text{ lb.} - 2,450 \text{ lb.} = 50 \text{ lb.};$   
 $\frac{50}{2500} = \frac{1}{50} = .02 = 2\%.$
16.  $\frac{61.50}{61.20} = \frac{5}{4} = 1.25 = 125\%.$

17.

1 oz. Troy = 480 gr., and 1 oz. avoirdupois = 437.5 gr.

$$\frac{437.5 \text{ gr.}}{480 \text{ gr.}} = \frac{175 \text{ gr.}}{192 \text{ gr.}} = .91\frac{7}{8} = 91\frac{7}{8}\%.$$

## CASE III.

Rate and Percentage given, to find Base.

18. 465 mi.  $\div$  .15 = 3,100 mi.

19. 32.12 da.  $\div$  .088 = 365 da.

20. 7.5 A. = .06 = 125 A.

21. 350 pupils  $\div$  .56 = 625 pupils.

22. 24  $\div$  .003 = 3,600.

23. \$986  $\div$  .39 = \$2,400.

24.

$37\frac{1}{2}\% = \frac{3}{8}$

$\frac{3}{8}$  of 16 yr. = 6 yr. = 40% of Richard's age; and

6 yr.  $\div$  .40 = 15 " = Richard's age.

## CASE IV.

Base and Rate given, to find either Amount or Difference.

25.

$1 - 25\% = .75$ ; and

$125 \times .75 = 93\frac{3}{4}$ .

26.

$1 + 5\frac{1}{2}\% = 1.05\frac{1}{2}$ ; and

$63 \times 1.05\frac{1}{2} = 66.57$ .

27.

$1 + 39\% = 1.39$ ; and

$5,800 \times 1.39 = 8,062$ .

28.

$1 - 45\% = .55$ ; and

$118.9 \text{ A.} \times .55 = 65.395 \text{ A.}$

29.

$1 + 88\% = 1.88$ ; and

$625 \text{ bu.} \times 1.88 = 1,175 \text{ bu.}$

30.

$1 + 6\% = 1.06$ ; and

$\$2,400 \times 1.06 = \$2,544$ .

31.

$1 - 75\% = .25$ ; and

$\$147 \times .25 = \$36.75$ .

32.

$$1 - 15\% = .85; \text{ and} \\ 14,260 \text{ copies} \times .85 = 12,121 \text{ copies.}$$

## CASH V.

Amount or Difference and Rate given, to find Base.

33.

$$1 + 7\% = 1.07; \text{ and} \\ 267.5 \div 1.07 = 250.$$

34.

$$1 - 16\% = .84; \text{ and} \\ \$1,155 \div .84 = \$1,375.$$

35.

$$1 + 25\% = 1.25; \text{ and} \\ \$2,500 \div 1.25 = \$2,000.$$

36.

$$1 - 15\% = .85; \text{ and} \\ 8,466 \div .85 = 9,960.$$

Or,

$$1 + 25\% = \frac{5}{4}; \text{ and} \\ \$2,500 \div \frac{5}{4} = \$2,000.$$

37.

$$1 + 12\frac{1}{2}\% = \frac{5}{4}; \text{ and} \\ 4,865 \text{ yd.} \div \frac{5}{4} = 4,324\frac{1}{4} \text{ yd.}$$

38.

$$1 - 18\frac{3}{4}\% = \frac{7}{8}; \text{ and} \\ \$325 \div \frac{7}{8} = \$400.$$

39.

$$1 - 20\% = .80; \text{ and} \\ 23\frac{1}{2} \text{ lb.} \div .80 = 29 \text{ lb. 6 oz., for second house.} \\ 1 + 17\frac{1}{2}\% = 1.175; \text{ and} \\ 23\frac{1}{2} \text{ lb.} \div 1.175 = 20 \text{ lb., for third house.}$$

40.

$$60 + 245 = 305 \\ 245 \text{ bu.} = 14,700 \text{ lb. of wheat.} \\ .72 \text{ of } 14,700 \text{ lb.} = 105,84 \text{ lb. of flour. (maize)} \\ 105,84 \text{ lb.} = 54 \text{ bar.}$$

41.

$$9 \text{ gal.} \div .40 = 22.5 \text{ gal. remaining; and} \\ 22.5 \text{ gal.} + 9 \text{ gal.} = 31.5 \text{ gal. in the cask at first.}$$

42.

$$1 + 5\% = 1.05; \text{ and} \\ \$61.40 \times 1.05 = \$64.47.$$

43.  $75\frac{1}{2} \div 423 = .17\frac{1}{2} = 17\frac{1}{2}\%$ .

44.  $73\%$  of 1,192 lb. = 870.16 lb.

45.  $68.25 \text{ lb.} \div 2,275 \text{ lb.} = .03 = 3\%$ .

46.  $51 \text{ yd.} \div .375 = 136 \text{ yd.}$

47.

$$1 - 76\% = .24; \text{ and}$$

$$2,175 \text{ bu.} \times .24 = 522 \text{ bu.}$$

48.  $63 \div .64 = 98.4375 = 98\frac{7}{8}$ .

49.  $3,157 \text{ children} \div 11,275 \text{ children} = .28 \text{ time. Hence, } 28\%$ .

50.  $1,124\%$  of \$1,256 = \$14,117.44.

51.

$$\$2,750 - \$935 = \$1,815, \text{ sum on credit.}$$

$$\$935 \div \$2,750 = .34 \text{ time} = 34\%, \text{ paid down.}$$

$$\$1,815 \div 6 = \$302.50, \text{ annual payment.}$$

$$\$302.50 \div \$2,750 = .11 \text{ time} = 11\%, \text{ at each annual payment.}$$

52.

$$1 + 32\% = 1.32; \text{ and}$$

$$45 \text{ ft.} \times 1.32 = 59.4 \text{ ft.}$$

53.

$$256 \div .20 = 1,280, \text{ wounded.}$$

$$1,280 \div .16 = 8,000, \text{ uninjured; and}$$

$$256 \text{ killed} + 1,280, \text{ wounded} + 8,000 \text{ uninjured} = 9,536 \text{ men.}$$

54.

$$\frac{11}{22}\% = \frac{1}{2}\% = \frac{1}{200} = \frac{1}{200}; \text{ and}$$

$$15 \text{ mi.} \times \frac{1}{200} = \frac{15}{200} \text{ mi.} = 30.72 \text{ rd.}$$

55.

$$55\% - 24\% = .31; \text{ and}$$

$$60.45 \div .31 = 195.$$

56.

$$110.5 \text{ gal.} \times .08\frac{1}{2} = 4.25 \text{ gal. leaked out.}$$

$$110.5 \text{ gal.} - 4.25 \text{ gal.} = 106.25 \text{ gal.; and}$$

$$106.25 \text{ gal.} \times .28 = 29.75 \text{ gal. sold.}$$

$$\text{Then, } 106.25 \text{ gal.} - 29.75 \text{ gal.} = 76\frac{1}{2} \text{ gal. left.}$$

57.  $25\%$  of  $40\% = .25 \times .40 = .10$ , or  $10\%$ , or  $\frac{1}{10}$ .

## 58.

His farm was whole, or 1.

After the sale, the size of his farm was  $1 - 28\% = .72$  of the first farm.

He purchased  $35\%$  of  $.72 = .252$  as much as the first farm.

He then had  $.72 + .252 = .972$  " " " " " "

$1 - .972 = .028$ , difference between the first farm and the last.

Then,  $5\frac{1}{4}$  A. or  $5.25$  A.  $= .028$ ; and

$5.25$  A.  $\div .028 = 187\frac{1}{2}$  A.

59.  $4\frac{1}{2} \div 27\frac{1}{2} = .16\frac{2}{3} = 16\frac{2}{3}\%$ .

## 60.

$560$  bu.  $- 25\%$  of  $560$  bu.  $= 420$  bu., 2d year's crop.

$\$1.80 + 25\%$  of  $\$1.80 = \$2.25$ , price of " " "

$560$  bu. @  $\$1.80 = \$1,008$ , receipts from 1st year's sales.

$420$  " "  $2.25 = 945$ , " " 2d " "

First year,  $\$63$  more.

## 61.

$1 - 4\% = .96$  of the regiment left after  $4\%$  deserted.

$6\frac{1}{4}\%$  of  $.96 = .06$  " " " killed.

$.96 - .06 = .90$  " " " then left.

$16\frac{2}{3}\%$  of  $.90 = .15$  " " " taken prisoners.

$.90 - .15 = .75$  " " " then left.

$12\%$  of  $.75 = .09$  " " " discharged.

$.75 - .09 = .66$  " " " remaining.

$660$  men  $= .66$  " " " "

$660$  men  $\div .66 = 1,000$  men in the regiment at first.

## 62.

$100\% - 70\% = 30\%$ , balance of time.

$30\%$  of  $90$  days  $= 27$  days, " " "

$100\% - 65\% = 35\%$  of wood to deliver.

$35\%$  of  $8,100$  cords  $= 2,835$  cords " " " "

$2,835$  cords  $\div 27 = 105$  " " " " " daily.

63.  $33\frac{1}{3}\% = \frac{1}{3}$ ; and  $7,465 \div \frac{1}{3} = 22,395$ .

64.  $15\%$  of  $484 = 72.6$ ; and  $72.6 \div .38 = 220$ .

65.

100% + 24% = 124%, capital at end of 1st year.

124% + 25% of 124% = 155%, " " " " 2d "

155% - 16% of 155% = 130.2%, " " " " 3d "

\$16,217 = 130.2% of his capital at first.

\$16,217 ÷ 1.302 = \$12,455.45, " " "

## SECTION III.

*I N S U R A N C E.*

1.  $\$7,250 \times .0125 = \$90.62\frac{1}{2}$ , premium.

2.  $\$2,800 \times .00\frac{7}{8} = \$24.50$ , premium.

3.

$\$1,506 + \$650 + \$475 = \$2,625$ , policy; and

$\$2,625 \times .00\frac{3}{4} = \$19.68\frac{3}{4}$ , premium.

4.  $\$521.25 \div \$27,800 = .01\frac{7}{8}$ , or  $1\frac{7}{8}\%$ .

5.  $\$172.50 \div \$3,450 = .05$ , or  $5\%$ .

6.  $\$116.25 \div \$15,500 = .00\frac{3}{4}$ , or  $\frac{3}{4}\%$ .

7.  $\$9.875 \div .0125 = \$750$ .

8.  $\$20 \div .00\frac{3}{4} = \$3,200$ .

9.  $\$141.75 \div .015 = \$9,450$ .

10.  $\$8,750 \times .00\frac{3}{4} = \$32.81\frac{1}{4}$ .

11.  $\$63.75 \div \$12,750 = .00\frac{1}{2}$ .

12.

$\$125,000 + \$40,000 = \$165,000$ , policy; and

$\$165,000 \times .015 = 2,475$ , premium.

13.  $\$312.37\frac{1}{2} \div .01\frac{1}{4} = \$17,850$ .

14.  $\$53.50 \div \$2,675 = .02 = 2\%$ .

15.  $\$27.50 \times 5 = \$137.50$

16.

$$\begin{aligned}
 50 \text{ yr.} - 30 \text{ yr.} &= 20 \text{ yr.}; \\
 \$24.75 \times 3 &= \$74.25; \\
 \$74.25 \times 20 &= \$1,485; \text{ and} \\
 \$3,000 - \$1,485 &= \$1,515.
 \end{aligned}$$

17.

$$\begin{aligned}
 \$26.84 \times 7 &= \$187.88; \text{ and} \\
 \$187.88 \times 2 &= \$375.76.
 \end{aligned}$$

## SECTION IV.

*COMMISSION.*

1.  $\$1,328 \times .05 = \$66.40.$

2.

$$\begin{aligned}
 420 \text{ bar. @ } \$21.50 &= \$9,030; \text{ and} \\
 \$9,030 \times .0125 &= 112.87\frac{1}{2}.
 \end{aligned}$$

3.

$$\begin{aligned}
 119.5 \text{ A. @ } \$96 &= \$11,472; \text{ and} \\
 \$11,472 \times .00\frac{1}{2} &= 71.70.
 \end{aligned}$$

4.

$$\begin{aligned}
 15,000 \text{ bu. @ } \$5.7 &= \$8,550; \text{ and} \\
 \$64.125 \div \$8,550 &= .0075, \text{ or } \frac{3}{4}\%.
 \end{aligned}$$

5.  $\$18.72 \div \$416 = .04\frac{1}{2} = 4\frac{1}{2}\%.$

6.  $\$56.70 \div \$945 = .06 = 6\%.$

7.

$$\begin{aligned}
 \$187.11 \div .015 &= \$12,474, \text{ sum paid for wool; and} \\
 \$12,474 \div \$44 &= 28,350 \text{ times} = 28,350 \text{ lb.}
 \end{aligned}$$

8.  $\$192.75 \div .03 = \$6,425.$

9.  $\$157.75 \div .025 = \$6,310.$

10.

$$\begin{aligned}
 \$3,126.20 \div 1.015 &= \$3,080, \text{ sum paid for land; and} \\
 \$3,080 \div \$35 &= 88 \text{ times} = 88 \text{ A.}
 \end{aligned}$$

11.  $\$901.25 \div 1.03 = \$875.$

12.

$\$4,076.80 \div 1.04 = \$3,920$ , sum paid for cotton; and  
 $\$3,920 \div \$.28 = 14,000$  times = 14,000 lb.

13.

$\$18,228 \times .01 = \$ 182.28$ , fees at 1%;  
 $\$37,600 - \$18,228 = 19,372.00$ ;  
 $\$19,372 \times .05 = 968.60$ , fees at 5%; and  
 $\$182.28 + \$968.60 = 1,150.88.$

14.  $\$7,315 \div 1.045 = \$7,000.$

15.  $\$484.50 \div 1.02 = \$475.$

16.

$\$4,725 \div 1.0225 = \$4,621.02$ , sum invested in wheat; and  
 $\$4,725 - \$4,621.02 = 103.97$ , commission.

17.

$\$1,350.20 \div 1.0275 = \$ 1,314.06$ , sum paid for beef; and  
 $\$1,350.20 - \$1,314.06 = 36.14$ , commission.

## SECTION V.

### PROFIT AND LOSS.

1.  $\$1,875 \times .04 = \$75.$

2.

$37\frac{1}{2}\% = \frac{3}{8}$ .  
 $\frac{3}{8}$  of  $\$.08 = \$.03$ ; and  
 $\$.08 + \$.03 = \$.11.$

3.

$\$62.50 - \$45 = \$17.50$ ; and  
 $\$17.50 \div \$62.50 = .28$ , or 28%.



4.

$$\$12 \div 200 = \$0.06 \text{ per pound;}$$

$$\$10 - \$0.06 = .04; \text{ and}$$

$$\$0.04 \div \$0.06 = .66\frac{2}{3} = 66\frac{2}{3}\%.$$

$$5. \$0.05 \div .20 \div \$0.25.$$

$$6. \$10.50 \div .375 = \$28.$$

$$7. \$6 \div .32 = \$18.75.$$

8.

$$33\frac{1}{3}\% = \frac{1}{3}; \frac{1}{3} \text{ of } \$15 = \$0.05; \text{ and}$$

$$\$15 + \$0.05 = \$15.05.$$

9.

$$\$75 \times .08 = \$6; \text{ and}$$

$$\$75 - \$6 = 69.$$

$$10. \$1,280 \times 1.125 = \$1,440.$$

$$11. \$4.875 \div 1.30 = \$3.75.$$

12.

$$1 - .12 = .88; \text{ and}$$

$$\$33 \div .88 = \$37\frac{1}{2}.$$

13.

$$1 - .15 = .85; \text{ and}$$

$$\$15,800 \div .85 = \$18,000.$$

14.

$$25\% = \frac{1}{4}; 1 + \frac{1}{4} = \frac{5}{4}; \text{ and}$$

$$\frac{5}{4} \text{ of } \$16 = \$20.$$

15.

$$\$15 - \$12\frac{1}{2} = \$2\frac{1}{2}; \text{ and}$$

$$\$0.25 \div \$1.25 = .20 = 20\%.$$

16.

$$25\% = \frac{1}{4}; 1 + \frac{1}{4} = \frac{5}{4}; \text{ and}$$

$$\frac{5}{4} \text{ of } \$96 = \$120.$$

$$17. \$540 \div 1.20 = \$450.$$

$$18. \$10.125 \div .15 = \$67.50$$

## SECTION VI.

## STOCKS.

1.

$$\begin{aligned} 17 \text{ shares of } \$100 \text{ each} &= \$1,700; \text{ and} \\ \$1,700 \times .05\frac{1}{2} &= \$93.50. \end{aligned}$$

2.

$$\begin{aligned} 38 \text{ shares} &= \$3,800; \text{ and} \\ \$3,800 \times .11 &= \$418. \end{aligned}$$

$$3. \$19,200 \times 1.2475 = \$23,952.$$

4.

$$\begin{aligned} 1 - .13 &= .87; \text{ and} \\ \$7,000 \times .87 &= \$6,090. \end{aligned}$$

5.

$$\begin{aligned} 65 \text{ shares} &= \$6,500; \\ \$6,500 \times 1.26 &= \$8,190; \text{ and} \\ \$8,190 \div .91 &= \$9,000 = 90 \text{ shares.} \end{aligned}$$

$$6. \$2,460 \div .82 = \$3,000.$$

$$7. \$6,642 \div 1.23 = \$5,400 = 54 \text{ shares.}$$

8.

$$\begin{aligned} 1.35 - 1.14\frac{1}{2} &= .20\frac{1}{2}; \text{ and} \\ 50 \text{ shares or } \$5,000 \times .205 &= \$1,025. \end{aligned}$$

$$9. \$5,694 \div 1.095 = \$5,200 = 52 \text{ bonds.}$$

10.

$$\begin{aligned} .09\frac{1}{2} - .02 &= .07\frac{1}{2} = 7\frac{1}{2}\% \text{ loss;} \\ 96 \text{ shares} &= \$9,600; \text{ and} \\ \$9,600 \times .075 &= \$720. \end{aligned}$$

11.

$$\begin{aligned} .04\frac{1}{2} + .07 &= .115 = 11\frac{1}{2}\% \text{ of gain;} \\ 76 \text{ shares} &= \$7,600; \text{ and} \\ 7,600 \times .115 &= \$874. \end{aligned}$$

12.

84 shares at 19% discount cost					\$6,804
35 shares @ 27½% discount sold for					\$2,537.50
49	"	"	8%	"	4,508
					<u>7,045.50</u>
He gained					\$241.50

13.

At 17% premium, 1 share will cost		\$117.00
(100% - 8% =) 92%.		
At 8% less than cost, 1 share will sell for		$\$117 \times .92 = 107.64$
Dividend on 1 share at 9%,		<u>9.00</u>
Total receipts on 1 share,		\$116.64
Loss on 1 share, $\$117 - \$116.64 = \$.36 = .36\%$ .		

## SECTION VII.

## TAXES AND DUTIES.

1.  $\$483.50 \div \$69,860 = .006\frac{1}{2}$ .

2.  $\$95,935 \div \$7,674,800 = .01\frac{1}{2} = 1\frac{1}{2}\%$ .

3.

$$\$1,250 + \$300 + \$3,000 = \$4,550, \text{ assessed valuation; and}$$

$$\$4,550 \times .0997 = \$44.13\frac{1}{2}, \text{ amount of tax.}$$

4.  $\$1,145 \div \$294,500 = .00388 +, \text{ or } .004.$

5.

$$\$928.80 \div \$967,500 = .00096, \text{ rate; and}$$

$$\$1,250 \times .00096 = \$1.20, \text{ tax.}$$

6.  $\$23.87\frac{1}{2} \div \$2,750 = .008\frac{1}{2}, \text{ or } \$.008\frac{1}{2} \text{ on } \$1.$

7.

$$.0035 + .0047 + .0105 = .0187, \text{ rate;}$$

$$\$1,350 \times .0187 = \$25.245; \text{ and}$$

$$\$25.24\frac{1}{2} + \$1.00 = 26.24\frac{1}{2}.$$

8.  $\$1,178.85 + .00125 = \$948,080.$

9.

$$\begin{aligned} \$473.40 \div \$39,450 &= .012, \text{ rate; and} \\ \$29.70 \div .012 &= \$2,475, \text{ valuation.} \end{aligned}$$

10.

$$\begin{aligned} \$3,284 - (\$350 + \$1,000) &= \$1,934, \text{ taxable income; and} \\ \$1,934 \times .05 &= \$96.70, \text{ income tax.} \end{aligned}$$

$$11. \$58,750 \times .003 = \$176.25.$$

12.

$$\begin{aligned} \$825 \times .05 &= \$41.25; \text{ and} \\ \$41.25 + \$10 &= 51.25. \end{aligned}$$

13.

$$\begin{aligned} 33\frac{1}{2} \text{ lb.} \times 175 &= 5,833\frac{1}{2} \text{ lb.} \\ 5,833\frac{1}{2} \text{ " } \times .25 &= 1,458\frac{1}{2} \text{ " } \text{ and} \\ 5,833\frac{1}{2} \text{ " } - 1,458\frac{1}{2} \text{ lb.} &= 4,375 \text{ " } \end{aligned}$$

14.

$$\begin{aligned} 62 \text{ lb.} \times 150 &= 9,300 \text{ lb.; and} \\ 9,300 \text{ " } @ \$ .25 &= \$2,325. \end{aligned}$$

$$15. 125 \text{ lb.} @ \$5.37\frac{1}{2} = \$675.87\frac{1}{2}.$$

16.

$$\begin{aligned} 72 \text{ hhd. sugar, } 475 \text{ lb. each,} &= 34,200 \text{ lb.} \\ \text{Less } 12\frac{1}{2}\% \text{ tare,} &\quad 4,275 \text{ " } \\ \text{Net weight of sugar,} &\quad 29,925 \text{ " } @ \$ .08 = \$897.75 \\ 50 \text{ hhd. molasses, } 126 \text{ gal. each} &= 6,300 \text{ gal., " } .08 = 504 \\ \text{Total duties,} &\quad \$1,401.75 \end{aligned}$$

17.

$$\begin{aligned} \$146,909 \div \$11,847,500 &= .0124, \text{ rate; and} \\ \$14,550 \times .0124 &= \$180.42. \end{aligned}$$

$$18. \$197.72 \div \$14,829 = .013\frac{1}{2}, \text{ or } 1\frac{1}{2}\%.$$

19.

$$\begin{aligned} \text{Income,} &\quad \$17,675 \\ \text{Less exemptions, } \$600 + \$200 + \$453 &= \quad 1,253 \\ \text{Amount of income taxable,} &\quad \$16,422 \\ \text{Tax on first } \$5,000 @ 5\%, &\quad \$250 \\ \text{" " } 11,422 \text{ " } 10\%, &\quad 1,142.20 \\ \text{Tax paid,} &\quad \$1,392.20 \end{aligned}$$

20.

2% + 3% = 5%; and  
5% of \$10,000 = \$500.

21.

50 cases tobacco, 65 lb. each, = 3,250 lb., @ \$.35 = \$1,187.50  
2,625 lb. cigars, @ \$.3 specific, = 7,875.00  
175 M. " " \$45 = \$7,875, 50% ad valorem = 3,937.50  
Amount of duties, \$12,950.00

22.

\$72,067.40 ÷ \$3,824,600 = .019, rate % of taxation.

## TAX TABLE.

On \$1, \$.019	On \$6, \$.114
" 2, .088	" 7, .183
" 3, .057	" 8, .152
" 4, .076	" 9, .171
" 5, .095	" 10, .19

## SECTION VIII.

## INTEREST.

## CASE I.

## Computations of Simple Interest.

1.	2.
\$515.50, Principal.	\$825, Principal.
.06, Rate.	.06, Rate.
\$30.9300, Int. for 1 yr.	\$ 19.50, Int. for 1 yr.
	325.00, Principal.
3	\$344.50, Amount.
\$117.25, Principal.	
.05, Rate.	
\$5.8625, Int. for 1 yr.	4. Amount, \$499.20.
2	
\$11.7250, Int. for 2 yr.	

5. Interest, \$85.48 ; amount, \$1,158.98.

6.

Time, 1 yr. 3 mo. = 15 mo.

\$2,160, Principal.

.07, Rate.

\$151.20, Int. for 1 yr.

$$\frac{\$151.20 \times 15}{12} = \$189, \text{ Int. for 15 mo.}$$

7.

Time, 2 yr. 8 mo. = 32 mo.

\$39.25, Principal.

.05, Rate.

\$1.9625, Int. for 1 yr.

$$\frac{\$1.9625 \times 32}{12} = \$5.23, \text{ Int. for 32 mo.}$$

8.

\$1,278, Principal.

.07, Rate.

\$89.46, Int. for 1 yr.

$$\frac{\$89.46 \times 11}{12} = \$82.01, \text{ Int. for 1 mo.}$$

1,278.00, Principal.

\$1,360.01, Amount.

9.

Time, 3 yr. 1 mo. = 37 mo.

\$9,500, Principal.

.04, Rate.

\$380, Int. for 1 yr.

$$\frac{\$380 \times 37}{12} = \$1,171.66\frac{2}{3}, \text{ Int. for 37 mo.}$$

10.

1869 yr. 9 mo. 11 da.

1868      5      11

Time, 1 yr. 4 mo. = 16 mo.

\$2,575, Principal.

.08, Rate.

\$206.00, Int. for 1 yr.

$$\frac{\$206 \times 16}{12} = \$274.67, \text{ Int. for 16 mo.}$$

## PERCENTAGE.

11.

Time, 4 mo. 9 da. = 4.3 mo.

\$198.50, Principal.

.04, Rate.

\$7.94, Int. for 1 yr.

 $\frac{\$7.94 \times 4.3}{12} = \$2.84$ , Int. for 4.3 mo.

12.

Time, 2 yr. 1 mo. 24 da. = 25.8 mo.

\$10,796, Principal.

.07, Rate.

\$755.72, Int. for 1 yr.

 $\frac{\$755.72 \times 25.8}{12} = \$1,624.798$ , Int. for 25.8 mo.

13.

Time, 1 mo. 15 da. = 1.5 mo.

\$18,450, Principal.

.055, Rate.

92250

9225

\$1,014.75, Int. for 1 yr.

 $\frac{\$1,014.75 \times 1.5}{12} = \$126.84$ , Int. for 1.5 mo.

18,450.00, Principal.

\$18,576.84, Amount.

14.

Time, 3 yr. 2 mo. 6 da. = 38.2 mo.

\$94.75, Principal.

.06, Rate.

\$5.6850, Int. for 1 yr.

 $\frac{\$5.685 \times 38.2}{12} = \$18.10$ , Int. for 38.2 mo.

15.

1869 yr. 10 mo. 25 da.

1867      9      24

Time, 2 yr. 1 mo. 1 da. = 25.0 $\frac{1}{2}$  mo.

\$978.18, Principal.

.08, Rate.

\$78.2544, Int. for 1 yr.

 $\frac{\$78.2544 \times 25.0\frac{1}{2}}{12} = \$163.25$ , Int. for 2 yr. 1 mo. 1 da.

978.18, Principal.

\$1,141.43, Amount.

16.

\$5,790  $\div 2$   
 \$2,895,  $\frac{1}{2}$  the Prin.  
.60, Rate at  $1\%$  per mo.  
 \$1,737.00, Interest.

17.

Time, 1 yr. 11 mo. = 23 mo.  
\$728.18  $\div 2$   
 \$364.09,  $\frac{1}{2}$  the Prin.  
.23, Rate at  $1\%$  per mo.  
 109227  
 72818  
\$88.7407, Interest.

18.

1870 yr. 12 mo. 13 da.  
 1869      3      14  
 Time, 1 yr. 8 mo. 29 da. =  $20.9\frac{2}{3}$  mo.  
\$2,765  $\div 2$   
 \$1,382.50,  $\frac{1}{2}$  the Prin.  
.209 $\frac{2}{3}$ , Rate at  $1\%$  per mo.  
 46083  
 46083  
 124425  
 27650  
\$ 289.86416, Interest.  
 2765.00,      Principal.  
 \$3,054.86,      Amount due.

19.

Time, 12 yr. = 144 mo.  
\$20  $\div 2$   
 \$10,  $\frac{1}{2}$  the Prin.  
 1.44, Rate at  $1\%$  per mo.  
\$14.40, Int. at  $6\%$ .  
 2.40, " "  $1\%$ .  
 \$12.00, Interest required.

20.

Time, 3 yr. 7 mo. = 43 mo.  
\$417.61  $\div 2$   
 \$208.805,  $\frac{1}{2}$  the Prin.  
.43, Rate at  $1\%$  per mo.  
 626415  
 835220  
\$89.78615, Int. at  $6\%$ .  
 29.9287, " "  $2\%$ .  
\$119.71,      Interest.  
417.61,      Principal.  
\$537.32,      Amount.



21.

\$785, Principal.  
.027  
 5145  
1470  
 \$19.845 | 6  
 \$3.807 | 6  
.551  
 \$3.858, Interest.

22.

1868 yr. 3 mo. 30 da.  
 1868      1      18  


---

 Time,      2 mo. 12 da. = 72 da.  
 \$ 250, Principal.  
.072  
 500  
175  
 \$18.000 | 6  
\$3.00 | 6  
.50  
 \$ 3.50, Interest.  
 250.00, Principal.  
\$253.50, Amount.

23.

1869 yr. 6 mo. 1 da.  
 1868      12      24  


---

 Time,      5 mo. 7 da. = 157 da.  
 \$25.50, Principal.  
.157  
 17850  
1275  
 255  
\$4.00350 | 6  
\$6.6725 | 6  
.1112  
 \$ .7784, Interest.  
 25.50, Principal.  
\$26.28, Amount.

24.

\$45.75, Principal.  
.090  
 \$4.1175 | 6  
\$6.862 |  
.11437  
 \$.8046, Interest.

25.

\$1,250, Principal.  
.063  
 375  
750  
 \$78.75 | 6  
\$13.125 | 6  
2.1875  
 \$ 15.3125, Interest.  
 1,250.00, Principal.  
\$1,265.311, Amount.

26. \$58.51.  
 27. \$652.35.  
 28. \$41.28.

29. \$1,660.10.	30. \$3,946.87½.	31. \$135.
32. \$1,350.86.	33. \$1,815.	34. \$3,245.
35. \$3,384.83½.	36. \$854.16.	37. \$197.92.
38. \$1,696.29.	39. \$9.20.	40. \$328.89.
41. \$84.78.	42. \$1,354.67.	43. \$942.42½.
44. \$29.75.	45. \$25,588.11.	46. \$1,324.16.
47. \$85.15.	48. \$1,960.	49. \$250.53.

50. He gains \$75 per annum.

# CASE II.

## Compound Interest.

In computing compound interest, when the mills in any product are 5 or more, they are regarded as 1 cent; and when less than 5, they are rejected.

51.

\$721.45, Prin.  
1.06, 1 + rate.

432870  
72145

\$764.74, Amt. for 1 yr.  
1.06, 1 + rate.

458844  
76474

\$810.62, Amt. for 2 yr.  
1.06, 1 + rate.

486872  
81062

\$859.26, Amt. for 3 yr.

52.

\$75.50 × 1.03 = \$77.765, Amount for 1st half-year.  
\$77.77 × 1.03 = \$80.10, " " 2d " "  
\$80.10 × 1.03 = \$82.50, " " 3d " "  
\$82.50 × 1.03 = \$84.98, " " 4th " "  
\$84.98 × 1.03 = \$87.53, " " 5th " "  
\$87.53 - \$75.50 = \$12.03, Compound Interest.

## 53.

$$\$25.75 \times 1.07 = \$27.55, \text{ Amt. for 1 yr.}$$

$$\$27.55 \times 1.07 = \$29.48, \text{ " " 2 "}$$

$$\$29.48 \times 1.07 = \$31.54, \text{ " " 3 "}$$

$$\$31.54 \times 1.07 = \$33.75, \text{ " " 4 "}$$

## 54.

$$\$525 \times 1.035 = \$543.38, \text{ Amt. 1 half-yr.}$$

$$\$543.38 \times 1.035 = \$562.40, \text{ " 2 " "}$$

$$\$562.40 \times 1.035 = \$582.08, \text{ " 3 " "}$$

## 55.

$$\$437.50 \times 1.015 = \$444.06, \text{ Amt. 1 quarter.}$$

$$\$444.06 \times 1.015 = \$450.72, \text{ " 2 quarters.}$$

$$\$450.72 \times 1.015 = \$457.48, \text{ " 3 "}$$

$$\$457.48 \times 1.015 = \$464.34, \text{ " 4 "}$$

$$\$464.34 \times 1.015 = \$471.31, \text{ " 5 "}$$

$$\$471.31 - \$437.50 = \$33.81, \text{ Compound interest.}$$

## 56.

24 $\frac{1}{2}$ % per annum is 2 $\frac{1}{4}$ % per month.

$$\$575 \times 1.02_{\frac{1}{4}} = \$586.74, \text{ Amt. 1 month.}$$

$$\$586.74 \times 1.02_{\frac{1}{4}} = \$598.72, \text{ " 2 months.}$$

$$\$598.72 \times 1.02_{\frac{1}{4}} = \$610.94, \text{ " 3 "}$$

$$\$610.94 \times 1.02_{\frac{1}{4}} = \$623.41, \text{ " 4 "}$$

$$\$623.41 \times 1.02_{\frac{1}{4}} = \$636.14, \text{ " 5 "}$$

$$\$636.14 \times 1.02_{\frac{1}{4}} = \$649.13, \text{ " 6 "}$$

$$\$649.13 \times 1.02_{\frac{1}{4}} = \$662.38, \text{ " 7 "}$$

$$\$662.38 \times 1.02_{\frac{1}{4}} = \$675.90, \text{ " 8 "}$$

$$\$675.90 \times 1.02_{\frac{1}{4}} = \$689.70, \text{ " 9 "}$$

$$\$689.70 \times 1.02_{\frac{1}{4}} = \$703.78, \text{ " 10 "}$$

$$\$703.78 \times 1.02_{\frac{1}{4}} = \$718.15, \text{ " 11 "}$$

$$\$718.15 \times 1.02_{\frac{1}{4}} = \$732.81, \text{ " 12 "}$$

$$\$732.81 \times 1.02_{\frac{1}{4}} = \$747.77, \text{ " 13 "}$$

$$\$747.77 \times 1.02_{\frac{1}{4}} = \$763.04, \text{ " 14 "}$$

$$\$763.04 \times 1.02_{\frac{1}{4}} = \$778.62, \text{ " 15 "}$$

$$\$778.62 \times 1.02_{\frac{1}{4}} = \$794.52, \text{ " 16 "}$$

$$\$794.52 \times 1.02_{\frac{1}{4}} = \$810.74, \text{ " 17 "}$$

$$\$810.74 \times 1.02_{\frac{1}{4}} = \$827.29, \text{ " 18 "}$$

\$827.29	$\times 1.02\frac{1}{4}$	= \$844.18, Amt. 19 months.
\$844.18	$\times 1.02\frac{1}{4}$	= \$861.42, " 20 "
\$861.42	$\times 1.02\frac{1}{4}$	$\times$ \$879.01, " 21 "
\$879.01	$\times 1.02\frac{1}{4}$	= \$896.96, " 22 "
\$896.96	$\times 1.02\frac{1}{4}$	= \$915.27, " 23 "
\$915.27	$\times 1.02\frac{1}{4}$	= \$933.96, " 24 "
\$933.96	$\times 1.02\frac{1}{4}$	= \$953.03, " 25 "
\$953.03	$\times 1.02\frac{1}{4}$	= \$972.49, " 26 "
\$972.49	$\times 1.02\frac{1}{4}$	= \$992.35, " 27 "
\$992.35	$\times 1.02\frac{1}{4}$	= \$1,012.61, " 28 "
\$1,012.61	$\times 1.02\frac{1}{4}$	= \$1,033.28, " 29 "
\$1,033.28	$\times 1.02\frac{1}{4}$	= \$1,054.88, " 30 "
\$1,054.88	$-$ \$575	= \$479.38, Compound interest.

## 57.

\$5,425	$\times$	.06	= \$ 325.50, Simple interest for 1 year.
\$325.50	$\times$	4	= \$1,302, " " " 4 years.
\$5,425	$\times$	1.06	= \$5,750.50, Amount for 1 year.
\$5,750.50	$\times$	1.06	= \$6,095.53, " " 2 "
\$6,095.53	$\times$	1.06	= \$6,461.26, " " 3 "
\$6,461.26	$\times$	1.06	= \$6,848.94, " " 4 "
\$6,848.94	$-$	\$5,425	= \$1,423.94, Compound Int. for 4 years.
\$1,423.94	Comp. Int.,	$-$ \$1,302, Simple Int.,	= \$121.94, Diff.

## CASE III. .

## Partial Payments.

## 58.

1868 yr. 8 mo. 28 da.	\$2,875, Prin.
1867 11 5	161, Int. to Aug. 23, 1868.
9 mo. 18 da. = 9.6 mo.	\$3,036, Amt.
1860 yr. 5 mo. 17 da.	1,000, Payment.
1868 8 23	\$2,036, New principal.
8 mo. 24 da. = 8.8 mo.	104.51, Int. to settlement.
	\$2,140.51, Amt. due.

## 59.

\$1,750,	Cost of property.
<u>500,</u>	Payment.
\$1,250,	Bal. on interest 1 yr.
<u>1.06</u>	
750	
<u>1250</u>	
\$1,325	Amt. due at time of 2d payment.
<u>387.50,</u>	2d payment.
\$987.50,	Balance due.

## 60.

1868 yr.	10 mo.	31 da.
<u>1867</u>	<u>3</u>	<u>14</u>
1 yr.	7 mo.	17 da. = 19.5 $\frac{1}{2}$ mo.
1869 yr.	6 mo.	11 da.
<u>1867</u>	<u>3</u>	<u>14</u>
2 yr.	2 mo.	27 da. = 26.9 mo.
1869 yr.	9 mo.	25 da.
<u>1869</u>	<u>6</u>	<u>11</u>
3 mo.	14 da.	= 3.4 $\frac{1}{2}$ mo.

Int. on Prin. for 19.5 $\frac{1}{2}$  mo., more than payment.

\$765, Prin.

120.04, Int. to June 11, 1869.

\$885.04, Amt. due, " " "

835, Sum of payments.

\$550.04, New principal.

11.12, Int. to Sept. 25, 1869.

\$561.16, Amt. due, " " "

## 61.

1867 yr. 12 mo. 28 da.

1867      5      7

7 mo. 21 da. = 7.7 mo.

1868 yr. 7 mo. 14 da.

1867      12      28

6 mo. 16 da. = 6.5½ mo.

1869 yr. 1 mo. 2 da.

1868      7      14

5 mo. 19 da. = 5.6½ mo.

\$10,000, Prin.

352.92, Int. to Dec. 28, 1867.

\$10,352.92, Amt., " " "

4,800.00, Payment.

\$ 5,552.92, New Prin.

166.28, Int. to July 14, 1868.

\$ 5,719.20, Amt., " " "

3,750.00, Payment.

\$ 1,969.20, New Prin.

50.84, Int. to Jan. 3, 1869.

\$ 2,020.04, Sum due, " " "

## 62—65.

*1st.—By the U. S. Court Rule.*

Principal, June 7, 1867, \$1,850.00

Interest to Oct. 17, 1867, 4 mo. 10 da., 40.08

Amount, \$1,890.08

Deduct payment, 250.00

New principal, Oct. 17, 1867, \$1,640.08

Interest to Feb. 23, 1868, 4 mo. 6 da., 34.44

Amount, \$1,674.52

Deduct payment, 100.00*Carried forward.*

*Brought forward.*

New principal, Feb. 23, 1868,	\$1,574.53
Interest to July 17, 1869, 1 yr. 4 mo. 24 da.,	132.26
Amount,	\$1,706.78
Deduct payments, \$50 + \$225,	275.00
New principal, July 17, 1869,	\$1,431.78
Interest to Oct. 1, 1869, 2 mo. 14 da.,	17.66
Amount, Oct. 1, 1869,	\$1,449.44

*2d.—By the Vermont Rule.***First Balance.**

	Unpaid yearly interests.	Principals and amounts.
To June 7, 1868, 1 yr. = 6% = .06.		
Principal,		\$ 1,850.00
Int. on principal for 1 yr., $\$1,850 \times .06 =$	\$ 111.00	
Am't of note, June 7, 1868,		\$ 1,961.00
From Oct. 17, 1867 to June 7, 1868, 7 mo. 23 da. = $3.8\frac{1}{2}\% = .038\frac{1}{2}$ .		
From Feb. 23 to June 7, 1868, 3 mo. 14 da. = $1.7\frac{1}{2}\% = .017\frac{1}{2}$ .		
Am't of 1st payment for 7 mo. 20 da., $\$250 \times 1.038\frac{1}{2} =$	\$ 259.58	
Am't of 2d payment for 3 mo. 14 da., $\$100 \times 1.017\frac{1}{2} =$	101.73	
Sum of amounts of 1st and 2d payments,		<u>361.31</u>
New principal, or balance due, June 7, 1868,		\$ 1,599.69

**Second Balance.**

To June 7, 1869, 1 yr. = 6% = .06.		
Int. on new prin. for 1 yr., $\$1,599.69 \times .06 =$	\$ 95.98	
From Dec. 30, 1868 to June 7, 1869, 5 mo. 8 da., = $2.6\frac{1}{2}\% = .026\frac{1}{2}$ .		
Am't of 3d payment for 5 mo. 8 da. (less than unpaid yearly int. due), $\$50 \times 1.026\frac{1}{2} =$	\$ 51.31	
Unpaid balances, June 7, 1869,	\$ 44.67	\$ 1,599.69

**Final Settlement.**

	Interest on un- paid interests.	
From June 7 to Oct. 1, 1869, 3 mo. 24 da. = $1.9\% = .019$ .		
Int. on prin. for 3 mo. 24 da., $\$1,599.68 \times .019 =$	30.39	
Interest on unpaid yearly int. for 3 mo. 24 da., $\$44.67 \times .019 =$	\$ .85	
Am't of interests due,		75.91
Am't of note, Oct. 1, 1869,		\$ 1,675.60

From July 17 to Oct 1, 1869,

2 mo. 14 da. =  $1\frac{13}{12}\%$  = .012 $\frac{1}{2}$ .

Am't of 4th payment for 2

mo. 14 da.,  $\$225 \times 1.012\frac{1}{2}$  =

227.78

Amount due Oct. 1, 1869,

\$1,447.82

*3d.—By the New Hampshire Rule.*

In this problem no payments having been made "expressly on account of interest accruing but not yet due," the computations are the same as under the Vermont Rule.

*4th.—By the Connecticut Rule.*

Principal, June 7, 1867, \$1,850.00

Interest to June 7, 1868, 111.00

Amount, \$1,961.00

Amount of 1st payment to June 7, 1868, \$259.58

Amount of 2d payment to June 7, 1868, 101.73

Sum of amounts of 1st and 2d payments, 361.31

New principal or balance, June 7, 1868, \$1,599.69

From June 7, 1868 to July 17, 1869,

1 yr. 1 mo. 10 da. =  $6\frac{2}{3}\%$  = .066 $\frac{2}{3}$ .

Interest on new principal for

1 yr. 1 mo. 10 da.,  $\$1,599.69 \times .066\frac{2}{3}$  106.65

Amount of note, July 17, 1869, \$1,706.34

Sum of payments,  $\$50 + \$225 =$  275.00

Balance due, July 17, 1869, \$1,431.34

Interest on principal to Oct. 1, 1869,

2 mo. 14 da.,  $\$1,431.34 \times .012\frac{1}{2} =$  17.65

Amount due, Oct 1, 1869, \$1,448.99

CASE IV.

Converse Operations in Interest.

66. 11 mo. 27 da. = 11.9 mo. =  $1\frac{1}{2}$  yr.

$\$580 \times .06 \times 1\frac{1}{2} = \$51, \text{Interest.}$

67. 1 yr. 7 mo. 18 da. = 19.6 mo. =  $1\frac{2}{3}$  yr.

$\$119.50 \times .073 \times 1\frac{2}{3} = \$14.24, \text{Interest.}$



68.

Int. of \$1 for 2 mo. 10 da., at 6%, = \$.011 $\frac{2}{3}$ .\$56  $\div$  .011 $\frac{2}{3}$  = \$4,800, principal.

69.

Int. of \$1 for 1 yr. 8 mo. 24 da., at 7%, = \$.121 $\frac{1}{3}$ .\$98.28  $\div$  \$.121 $\frac{1}{3}$  = 810 times = \$810, sum loaned.

70.

Amt. of \$1 for 2 yr. 4 mo., at 5%, = \$1.11 $\frac{2}{3}$ .\$7,365  $\times$  1.11 $\frac{2}{3}$  = \$8,224.25, amount.

71.

Amt. of \$1 for 7 mo. 10 da., at 9%, = \$1.055.

\$390  $\times$  1.055 = \$411.45, amount.

72.

Amt. of \$1 for 1 yr. 7 mo., at 6%, = \$1.095.

\$1,073.10  $\div$  \$1.095 = 980 times = \$980, principal.

73.

Amt. of \$1 for 5 yr. 4 mo. 12 da., at 4%, = \$1.214 $\frac{2}{3}$ .\$182.20  $\div$  \$1.214 $\frac{2}{3}$  = 150 times = \$150, principal.

74.

Int. of \$2,800 for 5 mo. 19 da., at 1%, = \$13.14 $\frac{2}{3}$ .\$118.30  $\div$  \$13.14 $\frac{2}{3}$  = 9 times = 9%.

75.

Int. of \$508.50 for 2 yr. 2 mo. 18 da., at 1%, = \$11.201125.

\$89.609  $\div$  \$11.201125 = 8 times = 8%.

76.

\$475  $\times$  .06 = \$28.50, interest for 1 yr.\$71.25  $\div$  \$28.50 = 2 $\frac{1}{2}$  times = 2 $\frac{1}{2}$  years, time.

77.

\$684  $\times$  .10 = \$68.40, interest for 1 yr.\$103.68  $\div$  \$68.40 = 1 $\frac{1}{3}$  times = 1 yr. 6 mo. 5 da., time.
$$\frac{13}{19}$$

## 78.

$$\begin{aligned}
 1 \text{ yr. } 1 \text{ mo. } 13 \text{ da.} &= 13.4\frac{1}{2} \text{ mo.} \\
 \$3,750 \times .07 &= \$262.50. \\
 \$262.50 \times 13.4\frac{1}{2} &= \$3,526.25. \\
 \$3,526.25 \div 12 &= \$293.85, \text{ interest.}
 \end{aligned}$$

## 79.

$$\begin{aligned}
 \text{Int. of } \$1 \text{ for } 2 \text{ yr. } 3 \text{ mo. } 18 \text{ da., at } 5\%, &= \$1.15. \\
 \$19.09 \div \$1.15 &= 166 \text{ times} = \$166, \text{ principal.}
 \end{aligned}$$

## 80.

$$\begin{aligned}
 \text{Int. of } \$6,000 \text{ for } 1 \text{ yr. } 11 \text{ mo., at } 1\%, &= \$115. \\
 \$805 \div \$115 &= 7 \text{ times} = 7\%.
 \end{aligned}$$

## 81.

$$\begin{aligned}
 \text{Int. of } \$1,350 \text{ for } 1 \text{ yr., at } 7\%, &= \$94.50. \\
 \$165.375 \div \$94.50 &= 1\frac{3}{4} \text{ times} = 1\frac{3}{4} \text{ yr., or } 1 \text{ yr. } 9 \text{ mo.}
 \end{aligned}$$

## 82.

$$\begin{aligned}
 3 \text{ yr. } 4 \text{ mo. } 10 \text{ da.} &= 40\frac{1}{2} \text{ mo.} \\
 \$288 \times .07 &= \$20.16 \\
 \$20.16 \times \frac{40\frac{1}{2}}{12} &= \$67.76 \\
 \$288 + \$67.76 &= \$355.76, \text{ amount.}
 \end{aligned}$$

## 83.

$$\begin{aligned}
 \text{Int. of } \$19,600 \text{ for } 1 \text{ yr., at } 4\frac{1}{2}\%, &= \$882. \\
 \$21,047.95 - \$19,600 &= \$1,447.95. \\
 \$1,447.95 \div \$882 &= 1\frac{7}{8} \text{ times} = 1 \text{ yr. } 7 \text{ mo. } 21 \text{ da., time.}
 \end{aligned}$$

## 84.

$$\begin{aligned}
 1869 \text{ yr. } 1 \text{ mo. } 25 \text{ da.} - 1865 \text{ yr. } 9 \text{ mo. } 15 \text{ da.} &= 3 \text{ yr. } 4 \text{ mo. } 10 \text{ da.} \\
 \text{Amount of } \$1 \text{ for } 3 \text{ yr. } 4 \text{ mo. } 10 \text{ da., at } 7\%, &= \$1.235\frac{5}{8}. \\
 \$169.85 \div \$1.235\frac{5}{8} &= 137.45 \text{ times} = \$137.45, \text{ face of note.}
 \end{aligned}$$

## 85.

$$\begin{aligned}
 \text{Interest of } \$560 \text{ for } 2 \text{ yr. } 11 \text{ mo. } 15 \text{ da., at } 1\%, &= \$16.56\frac{3}{4}. \\
 (\$659.40 - \$560) \div \$16.56\frac{3}{4} &= 6 \text{ times} = 6\%.
 \end{aligned}$$

## SECTION IX.

*D I S C O U N T.*

1.  $\$375.75 \times .025 = \$9.39$ , commercial discount.

2.  $\$237.50 \times .03 = \$7.12\frac{1}{2}$ , commercial discount.

3.

$$\$1,302.40 \times .05 = \$65.12.$$

$$\$1,302.40 - \$65.12 = \$1,237.28, \text{ sum paid.}$$

4.

Amount of \$1 for 8 mo., at 6%, = \$1.04.

$$\$375.70 \div \$1.04 = \$361.25 \text{ times} = \$361.25.$$

$$\$375.70 - \$361.25 = \$14.45.$$

5.

Amount of \$1 for 1 yr. 3 mo., at 7%, = \$1.0875.

$$\$304.50 \div 1.0875 = \$280, \text{ present worth.}$$

6.

Amount of \$1 for 7 mo. 6 da., at 7%, = \$1.042.

$$\$56.000 \div 1.042 = \$53.74, \text{ present worth.}$$

$$\$56 - \$53.74 = \$2.26, \text{ discount.}$$

7.

$$\$975 \times .05 = \$48.75.$$

$$\$975 - \$48.75 = \$926.25, \text{ net proceeds.}$$

Interest of \$926.25 for 60 da., at 7%, = \$10.81.

$$\$926.25 + \$10.81 \text{ interest} = \$937.06, \text{ Amt. of loan.}$$

$$\$975 - \$937.06 = \$37.94, \text{ gain.}$$

8.

1 yr. - 4 mo. 24 da. = 7 mo. 6 da.

Amt. of \$1 for 7 mo. 6 da., at 7%, = \$1.042.

$$\$140 \div 1.042 = \$134.36, \text{ sum paid.}$$

9.

 $\$1,712 \times .07 = \$119.84$ , interest for 1 yr.

Amt. of \$1 for 1 yr., at 7%, = \$1.07.

 $\$1,712 \div 1.07 = \$1,600$ .

 $\$1,712 - \$1,600 = \$112$ , discount.

 $\$119.84 - \$112 = \$7.84$ , excess of interest over discount.

10.

 $\$1,260 - 5\%$  of itself = \$1,197, proceeds at 30 days.

 $\$1,197 - 10\%$  of itself = \$1,077.30, cash proceeds.

11.

 $\$920 - 25\%$  of itself = \$690.

 $\$690 - 2\frac{1}{2}\%$  of itself = \$672.75, net proceeds.

12.

 $\$1 - 20\%$  of itself = \$.80;  $5\%$  of \$.80 = \$.04.

 $\$.80 - \$.04 = \$.76$ .

 $\$1 - 5\%$  of itself = \$.95;  $20\%$  of \$.95 = \$.19.

 $\$.95 - \$.19 = \$.76$ .

There is no difference.

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## SECTION X.

### *GOVERNMENT SECURITIES.*

1.

 $\$3,000 \times 1.0325 = \$3,097.50$ , cost of bonds.

2.

 $100\% - 32\% = 68\% = .68$ .

 $\$21,500 \times .68 = \$14,620$ , proceeds.

3.

 $\$5,400 \times 1.24 = \$6,696$ , amount of currency.

4.

 $\$.96$  in money paid for \$1 in bonds;

 $\$10,176 \div \$.96 = 10,600$  times = \$10,600.

5.

$$\$5,485 \div 1.37125 = \$4,000, \text{ gold value.}$$

6.

interest on 7-80's,  $7\frac{2}{10}\%$  currency.

$$.073 \text{ (interest)} \div \$1.02 \text{ (cost)} = .07\frac{2}{11} = 7\frac{2}{11}\%, \text{ currency interest on 7-80's.}$$

$$\text{interest on 5-20's, } 6\% \text{ gold, at } 140 = (\$.06 \times 1.40 =) \$.084 \text{ currency.}$$

$$$.084 \text{ (interest)} \div \$1.08 \text{ (cost)} = .07\frac{1}{3} = 7\frac{1}{3}\%, \text{ currency interest on 5-20's.}$$

Hence, the 5-20's are  $7\frac{1}{3}\% - 7\frac{2}{11}\% = \frac{2\frac{1}{3}}{11}\% = .62+\%$  the better investment.

7.

$$5\% \text{ discount} - 3\frac{1}{2}\% \text{ discount} = 1\frac{1}{2}\% \text{ loss; and}$$

$$\$1,500 \times .01\frac{1}{2} = \$22.50, \text{ sum lost.}$$

8.

$$100\% - 28\% = 72\%, \text{ market value.}$$

$$\$5,400 \div .72 = \$7,500, \text{ par value of bonds purchased.}$$

$$\$7,500 \times .06 = \$450, \text{ interest on investment, due annually.}$$

$$\$450 \div \$5,400 = .08\frac{1}{3} = 8\frac{1}{3}\% \text{ on investment.}$$

9.

$$\$20,500 \div 1.02\frac{1}{2} = \$20,000, \text{ par value of stock purchased.}$$

$$\$20,000 \times 5\%, \text{ rate of int. on 10-40's,} = \$1,000, \text{ int. in gold.}$$

$$\$1,000 \times 1.35, \text{ worth of gold in currency,} = \$1,350, \text{ currency value of } \$1,000 \text{ in gold.}$$

$$\$1,350 \div \$20,500 = .06\frac{1}{4} = 6\frac{1}{4}\%.$$

## SECTION XI.

*B A N K I N G .*

1.

The bank discount on \$1 for 4 mo. 3 da., at 6%, = \$.0205.  
 $\$2,500 \times .0205 = \$51.25$ , bank discount required.

2.

The proceeds of \$1 for 93 days, at 7%, = \$.98191  $\div$   $\frac{1}{2}$ .  
 $\$650 \times .98191\frac{1}{2} = \$638.25$ , proceeds of note.

3.

1868 yr. 8 mo. 12 da. — 1868 yr. 5 mo. 20 da. = 2 mo. 22 da.,  
 time.

Proceeds of \$1 for 2 mo. 25 da., at 7%, = \$.98341 $\frac{1}{2}$ .  
 $\$7,350 \times .98341\frac{1}{2} = \$7,228.5208\frac{1}{2}$ , proceeds.

4.

The proceeds of \$1 for 33 da., at 6%, = \$.9945.  
 $\$11,500 \times .9945 = \$11,436.75$ , sum realized.

5.

The interest of \$1 for 4 mo. 3 da., at 8%, = \$.0273 $\frac{1}{2}$ .  
 $\$1 - $.0273\frac{1}{2} = $.9726\frac{1}{2}$ , proceeds of \$1.  
 $\$4,500 \div .9726\frac{1}{2} = \$4,626.46$ , face of note.

6.

The interest of \$1 for 3 mo. 3 da., at 6%, = \$.0155.  
 $\$1 - $.0155 = $.9845$ , proceeds of \$1.  
 $\$237 \div .9845 = \$240.74$ , face of note.

7.

The interest of \$1 for 63 da., at 6%, = \$.0105.  
 $\$1 - $.0105 = $.9895$ , proceeds of \$1.  
 $\$2,000 \div .9895 = \$2,021.22$ , face of note.

8.

Discount on \$1 for 6 mo. 3 da., at 10%, = \$.0508 $\frac{1}{2}$ .

\$1 - \$.0508 $\frac{1}{2}$  = \$.9491 $\frac{1}{2}$ , proceeds of \$1.

\$4,500  $\times$  .9491 $\frac{1}{2}$  = \$4,271.25, proceeds of note.

9.

The proceeds of \$1 for 33 da., at 6%, = \$1 - \$.0055 = \$.9945.

\$2,000  $\div$  .9945 = \$2,011.06, face of note.

10.

\$3,700  $\times$  .05 = \$185, commercial discount.

\$3,700 - \$185 = \$3,515, proceeds.

The present worth of \$1 due in 3 mo. 3 da., at 7%, = \$.9819 $\frac{1}{4}$ .

\$3,515  $\div$  .9819 $\frac{1}{4}$  = \$3,579.73, face of bank note.

\$3,700, amount of bill, - \$3,579.73, face of bank note, =  
\$120.27, amount made by borrowing.

11.

The amount of \$460 for 8 mo. 3 da., at 7%, = \$481.735.

1869 yr. 3 mo. 19 da.

1869      1          9

2 mo. 10 da., time from date of note to date of discount.

8 mo. 3 da. - 2 mo. 10 da. = } Time from date of discount to  
5 mo. 23 da. =  $\frac{5}{12}$  yr. } maturity of note.

\$481.735  $\times$  .08  $\times$   $\frac{5}{12}$  = \$18.52, bank discount on note.

\$481.735 - \$18.52 = \$463.215, proceeds of note.

12.

\$1 - \$.0255 = \$.9745, proceeds of \$1.

\$1,856  $\div$  \$.9745 = 1,904.57 times = \$1,904.57, face of note.

13.

The proceeds of \$1 due in 6 mo. 3 da., at 10% = \$1 -

\$.0508 $\frac{1}{2}$  = \$.9491 $\frac{1}{2}$ .

\$875  $\div$  \$.9491 $\frac{1}{2}$  = 921.86 times = \$921.86, face of the note.

## 14.

\$1,600 at 6%, for 6 mo. 3 da., = \$1,648.80, amount of the note.

Bank discount on \$1 for 2 mo. 3 da., at 6%, = \$.0105.

\$1,648.80  $\times$  .0105 = \$17.3124, bank discount on face of note.

\$1,648.80 - \$17.3124 = \$1,631.487, proceeds.

## SECTION XII.

*EXCHANGE.*

## 1.

\$1 face + \$.02 premium = \$1.02, cost of \$1 of draft.

\$1.02  $\times$  2,700 = \$2,754, cost of draft.

## 2.

\$280  $\times$  .00 $\frac{1}{2}$ , rate of exchange, = \$1.40, discount on exchange.

\$280 - \$1.40 = \$278.60, cost of remittance.

## 3.

\$1,285  $\times$   $\frac{1}{2}$ %, rate of exchange, = \$6.42, discount on exchange.

\$1,285 - \$6.42 = \$1,278.58, cost of draft.

## 4.

\$532  $\times$  3 $\frac{1}{4}$ %, rate of exchange, = \$17.29, premium on exchange.

\$532 + \$17.29 = \$549.29, cost of draft.

## 5.

\$1 face + \$.025 premium = \$1.025, cost of \$1 of draft.

\$246  $\div$  \$1.025 = 240 times = \$240, face of draft.

## 6.

\$1 face - \$.03 discount = \$0.97, cost of \$1 of draft.

\$145.50  $\div$  \$.97 = 150 times = \$150, face of draft.

## 7.

\$1 face + \$.01 $\frac{1}{2}$  premium = \$1.01 $\frac{1}{2}$ , cost of \$1 of draft.

\$1,200  $\times$  1.01 $\frac{1}{2}$  = \$1,221, value of sight draft.

\$1,200  $\times$  .005 $\frac{1}{2}$  = \$6.60, bank discount for 33 da., at 6%.

\$1,221 - \$6.60 = \$1,214.40, sum paid for draft.



8.

\$1 face + \$.04 $\frac{1}{2}$  premium = \$1.04 $\frac{1}{2}$ , cost of \$1 of draft.  
 $\$860 \times 1.04\frac{1}{2} = \$898.70$ , value of sight draft.  
 $\$860 \times .0155 = \$13.33$ , bank discount for 93 da., at 6%.  
 $\$898.70 - \$13.33 = \$885.37$ , sum paid for the draft.

9.

The bank discount of \$1 for 63 da., at 6%, = \$.0105.  
 $\$1 - \$.0105 = \$.9895$ , proceeds of \$1.  
 $\$.9895 + .03$ , rate of exchange, = \$1.0195, cost of \$1 of draft.  
 $\$611.70 \div 1.0195 = \$600$ , face of draft.

10.

The bank discount of \$1 for 33 da., at 6%, = \$.0055.  
 $\$.0055 + \$.015$ , rate of exchange, = \$.0205, cost of discount and exchange on \$1.  
 $\$1 - \$.0205 = \$.9795$ , cost of \$1 of draft.  
 $\$352.63 \div .9795 = \$360$ , face of draft.

## SECTION XIII.

*AVERAGE OF PAYMENTS.*

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## CASE I.

The terms of Credit beginning at the same Date.

1.

\$200 cash payment.

200 for 4 mo.	= \$ 800 for 1 mo.
200 " 8 "	= 1,600 " 1 "
200 " 12 "	= 2,400 " 1 "

\$800 for ? mo. = \$4,800 for 1 mo.

$\$4,800 \div \$800 = 6$  times = 6 mo., average term of credit.

March 8 + 6 mo. = Sept. 8.

## 2.

\$825 for 3 mo. = \$2,475 for 1 mo.

675 " 4 " = 2,700 " 1 "

450 " 2 " = 900 " 1 "

800 " 1 " = 800 " 1 "

\$2,750 for ? mo. = \$6,875 for 1 mo.

$\$6,875 \div \$2,750 = 2\frac{1}{2}$  times =  $2\frac{1}{2}$  mo.

May 29 +  $2\frac{1}{2}$  mo. = Aug. 14.

## 3.

$\$300 \div 4 = \$75$

\$75 for 3 mo. = \$225 for 1 mo.

75 " 6 " = 450 " 1 "

75 " 9 " = 675 " 1 "

75 " 12 " = 900 " 1 "

\$300 for ? mo. = \$2,250 for 1 mo.

$\$2,250 \div \$300 = 7\frac{1}{2}$  times =  $7\frac{1}{2}$  mo.

May 1 +  $7\frac{1}{2}$  mo. = Dec. 16.

## 4.

\$150 for 30 da. = \$ 4,500 for 1 da.

200 " 60 " = 12,000 " 1 "

250 " 90 " = 22,500 " 1 "

\$600 for ? da. = \$39,000 for 1 da.

$\$39,000 \div \$600 = 65$  times = 65 da. from to-day.

## 5.

\$300 for 3 mo. = \$ 900 for 1 mo.

500 " 5 " = 2,500 " 1 "

150 " 7 " = 1,050 " 1 "

350 " 9 " = 3,150 " 1 "

200 " 12 " = 2,400 " 1 "

\$1,500 for ? mo. = \$10,000 for 1 mo.

$\$10,000 \div \$1,500 = 6\frac{2}{3}$  times =  $6\frac{2}{3}$  mo., average term of credit.

June 17 +  $6\frac{2}{3}$  mo. = Jan. 6.

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## CASE II.

The terms of Credit beginning at different Dates.

6.

Jan. 10 + 3 mo. = Apr. 10.

Feb. 25 + 4 " = June 25.

Apr. 5 + 2 " = June 5.

\$415 Cash, Apr. 10.

175 for 76 da. = \$13,300 for 1 da.

350 " 56 " = 18,550 " 1 "

\$940 for ? da. = \$31,850 for 1 da.

\$31,850 ÷ \$940 = 35 times = 35 da., average term of credit.

April 10 + 35 da. = May 15.

7.

July 12 + 90 da. = Oct. 10.

" 25 + 60 " = Sept. 23.

Aug. 14 + 30 " = " 13.

\$445 Cash, Sept. 13.

555 for 10 da. = \$ 5,550 for 1 da.

650 " 27 " = 17,550 " 1 "

\$1,650 for ? da. = \$23,100 for 1 da.

\$23,100 ÷ \$1,650 = 14 times = 14 da., average term of credit.

Sept. 13 + 14 da. = Sept. 27.

8.

40 bar. @ \$17.50 = \$ 700

60 " " 24.00 = 1,440

150 " " 8.00 = 1,200

March 14 + 3 mo. = June 14.

May 1 + 3 mo. = Aug. 1.

\$1,200 Cash, June 10.

700 for 4 da. = \$ 2,800 for 1 da.

1,440 " 52 " = 73,440 " 1 "

\$3,340 for ? da. = \$76,240 for 1 da.

\$76,240 ÷ \$3,340 = 22 times = 22 da., average term of credit.

June 10 + 22 da. = July 2.

## 9.

\$107 Cash, May 19.

35 for 9 da. = \$ 315 for 1 da.

130 " 39 " = 5,070 " 1 "

70 " 45 " = 3,150 " 1 "

80 " 97 " = 7,760 " 1 "

175 " 115 " = 20,125 " 1 "

\$597 for ? da. = \$36,420 for 1 da.

\$36,420 ÷ \$597 = 61 times = 61 da., average term of credit.

May 19 + 61 da. = July 19.

## 10.

\$30 due June 15; \$30 Cash, June 15.

30 " July 15; 30 for 30 da. = \$ 900 for 1 da.

30 " Aug. 15; 30 " 61 " = 1,830 " " "

60 " Sept. 15; 60 " 92 " = 5,520 " " "

60 " Oct. 15; 60 " 122 " = 7,320 " " "

60 " Nov. 15; 60 " 153 " = 9,180 " " "

30 " Dec. 15; 30 " 183 " = 5,490 " " "

30 " Jan. 15; 30 " 214 " = 6,420 " " "

30 " Feb. 15; 30 " 245 " = 7,350 " " "

\$360 for ? da. = \$44,010 for 1 da.

\$44,010 ÷ \$360 = 122½ times = 122 da., average term of credit.

June 15 + 122 da. = Oct. 15.

## CASE III.

Accounts containing both Debits and Credits.

## 11.

*Dr.*

June 14 + 3 mo. = Sept. 14.

Aug. 25 + 3 " = Nov. 25.

Oct. 11 + 3 " = Jan. 11.

\$450 Cash, Sept. 14.

175 for 72 da. = \$12,600 for 1 da.

425 " 119 da. = 50,575 " 1 "

\$1,050 for ? da. = \$63,175 for 1 da.

\$63,175 ÷ \$1,050 = 60 times = 60 da., average term of credit.

*Cr.*

\$400 Cash, Sept. 3.

150 for 60 da. = \$ 9,000 for 1 da.

225 " 88 " = 19,800 " 1 "

\$775 for ? da. = \$28,800 for 1 da.

\$28,800 ÷ \$775 = 37 times 37 da., average term of payments.

Sept. 3 + 3 da. = Oct. 10, { average time of  
payments.

Focal date, Nov. 13.

From Oct. 10 to Nov. 13 = 34 da.

\$1,050 - \$775 = \$275, balance.

\$775 for 34 da. = \$26,350 for 1 da.

275 " ? " = 26,350 " 1 "

\$26,350 ÷ \$275 = 96 times = 96 da. { average time of  
bal. of %.Nov. 13 + 96 da. = Feb. 17, 1870, { date of payment of  
balance of %.

12.

*Dr.*

Oct. 9 + 3 mo. = Jan. 9.

Nov. 18 + 3 " = Feb. 18.

Nov. 27 + 3 " = Feb. 27.

Dec. 19 + 3 " = Mar. 19.

\$300 Cash, Jan. 9.

329 for 40 da. = \$13,160 for 1 da.

142 " 49 " = .6,958 " 1 "

256 " 69 " = 17,664 " 1 "

\$1,027 for ? da. = \$37,782 for 1 da.

\$37,782 ÷ \$1,027 = 37 times = 37 da., average term of credit.

Jan. 9 + 37 da. = Feb. 15, { average time for  
payment of debits.*Cr.*

\$ 25 Cash, Nov. 24.

500 for 10 da. = \$ 5,000 for 1 da.

150 " 36 " = 5,400 " 1 "

\$675 for ? da. = \$10,400 for 1 da.

\$10,400 ÷ \$675 = 15 times = 15 da., average term of payments.

Nov. 24 + 15 da. = Dec. 9.

*Carried forward.*

*Brought forward.*

Focal date, Feb. 15.

From Feb. 15 to Dec. 9 = 68 da.

\$1,027 - \$675 = \$352, balance.

\$675 for 68 da. = \$45,900 for 1 da.

252 " ? da. = \$45,900 " 1 da.

 $\$45,900 \div \$352 = 130 \text{ times} = 130 \text{ da.}, \text{ average time of bal. of } \%$ Feb. 15 + 130 da. = June 25,  $\left\{ \begin{array}{l} \text{Date of payment} \\ \text{of bal. of } \% \end{array} \right.$ 

## 13.

*Dr.*

Mar. 17 + 2 mo. = May 17.

Apr. 20 + 3 " = July 20.

July 18 + 0 " = " 18.

Aug. 11 + 4 " = Dec. 11.

Sept. 25 + 2 " = Nov. 25.

\$325 Cash, May 17.

108 for 64 da. = \$ 6,912 for 1 da.

264 " 62 " = 16,368 " 1 "

50 " 208 " = 10,400 " 1 "

125 " 192 " = 24,000 " 1 "

 $\$872 \text{ for } ? \text{ da.} = \$57,680 \text{ for 1 da.}$  $\$57,680 \div \$872 = 66 \text{ times} = 66 \text{ da.}, \text{ average term. of credit.}$ 

May 17 + 66 da. = July 22.

*Cr.*

\$125 Cash, July 25.

300 for 23 da. = \$ 6,900 for 1 da.

850 " 91 " = 31,850 " 1 "

 $\$775 \text{ for } ? \text{ da.} = \$38,750 \text{ for 1 da.}$  $\$38,750 \div \$775 = 50 \text{ times} = 50 \text{ da.}, \text{ average term of payments.}$ 

July 25 + 50 da. = Sept. 13.

Focal date, July 22.

From July 22 to Sept. 13 = 53 da.

\$872 - \$775 = \$97, balance.

\$775 for 53 da. = \$41,075 for 1 da.

97 " ? " = 41,075 " 1 "

## SECTION XIV.

*REVIEW PROBLEMS IN PERCENTAGE.*

1.

$$13\frac{3}{4}\% \text{ of } 837 \text{ bu.} = 114.39 \text{ bu.}$$

2.

\$56, cost.

50, selling price.

---

\$ 6, loss.

$$\$6 \div \$56 = .10\frac{7}{8}.$$

Hence,  $10\frac{7}{8}\%$ , loss.

3.

(100 shares =) \$10,000 @  $1.54\frac{1}{2}$ , cost \$15,450. $\frac{1}{4}\%$  of \$15,450 = \$38.62 $\frac{1}{2}$ , brokerage.

$$\$15,450 + \$38.62\frac{1}{2} = \$15,488.62\frac{1}{2}, \text{ total cost.}$$

4.

1,875 persons — 1,265 persons = 110 persons; and  
110 is 8% of 1,375.

5.

$$1\% + 1\frac{1}{2}\% = 2\frac{1}{2}\%; \text{ and } \$35 \div .025 = \$1,400.$$

6.

From June 27 to Apr. 4 = 9 mo. 7 da. =  $9.2\frac{1}{2}$  mo.10% on \$36.50 = \$3.65, and  $\frac{12.5}{100} \times 2.2\frac{1}{2}\% = \$ 2.81, \text{ Int.}$ 

36.50, Prin.

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\$39.31, Amt.

7.

1 + commission = 1.025; and

$$\$820 \div 1.025 = \$800, \text{ sum expended.}$$

8.

Borrowed money on interest from Feb. 21 to Nov. 13, 8 mo.  
22 da., or  $8\frac{7}{8}$  mo.

\$4,000

.06, rate in Me.

\$240, interest for 1 yr.

$\frac{\$240 \times 8\frac{7}{8}}{12} = \$174.666$ , interest on sum borrowed.

Money loaned on interest from Feb. 23 to Nov. 12, 8 mo. 19 da.,  
or  $8\frac{6}{8}$  mo.

\$4,000

.07, rate in N. Y.

\$280, interest for 1 yr.

$\frac{\$280 \times 8\frac{6}{8}}{12} = \$201.444$ , interest on sum loaned.

$\$201.444 - \$174.666 = \$26.778$ , gain.

9.

C's share, \$ 2,550

B's "  $\$2,550 \div .60 = 4,250$

A's "  $4,250 \div .85 = 5,000$

Value of the mill, \$11,800

10.

$\$8,000 + \$12,750 = \$20,750$ , amount insured.

$\$363.12\frac{1}{2} \div \$20,750 = .01\frac{1}{4} = 1\frac{1}{4}\%$ .

11.  $\$1,500 - \$1,175 = \$325$ ; and  $5\%$  on  $\$325 = \$16.25$ .

12.

$\$2,500 \div \$100 = 25$ ; and  $25 \times \$4.489 = \$110.97\frac{1}{2}$ , annual premium.

$\$110.97\frac{1}{2} \div 2 = \$55.48$ , semi-annual payment.

13.

$\$800 + \$750 + \$1,200 = 2,750$ , amount insured.

$\frac{1}{4}\%$  on  $\$2,750 = \$17.19$ .

14.

Weight of 1st boat,	64 T.
" " 2d " $85\%$ of 64 T. =	54.4 "
" " 3d " $67\frac{1}{2}\%$ " 64 " =	43.2 "
" " 4th " $120\%$ " 64 " =	76.8 "
" " 5th " $56\frac{1}{4}\%$ " 64 " =	36 "

Total weight, 274.4 T.



15.

 $\frac{1}{4}\%$  on \$350 = \$1.25, cost of exchange;

\$250 + \$1.25 = \$251.25, cost of sight draft for \$250.

Discount on \$1 for 63 da., at 6%, \$ .0105.

" " \$250 " " " " " \$2.62 $\frac{1}{2}$ .\$251.25 - \$2.62 $\frac{1}{2}$  = \$248.62 $\frac{1}{2}$ , cost of draft at 60 days.

16.

 $(33 + 44 + 54 + 60 =)$  191 pupils in the school.33 pupils =  $\frac{33}{191} = .17\frac{53}{191} = 17\frac{53}{191}\%$  of whole school.44 " =  $\frac{44}{191} = .23\frac{7}{191} = 23\frac{7}{191}\%$  " " "54 " =  $\frac{54}{191} = .28\frac{52}{191} = 28\frac{52}{191}\%$  " " "60 " =  $\frac{60}{191} = .31\frac{79}{191} = 31\frac{79}{191}\%$  " " "

17.

1869 yr. 1 mo. 19 da.

Principal, \$360

1868 4 10

Int. to Jan. 19, 1869, 16.74

9 mo. 9 da. = 9.3 mo. Amt. " " " " \$376.74

1869 yr. 11 mo. 3 da.

Payment, 225

1869 1 19

New principal, \$151.74

9 mo. 14 da. = 9.4 $\frac{1}{2}$  mo. Int. to Nov. 3, 1869, 7.18

Amt. due Nov. 3, 1869, \$158.92

18.

Bought 100 shares Pacific R. R., @ 117, cost \$11,700

Sold 55 " " " " 104 $\frac{1}{2}$ , \$5,747.50

45 shares @ 108 exchanged for \$4,860

\$4,860  $\div$  \$135 = 36 times = 36 shares

Ocean Bank.

Sold 36 shares Ocean Bank, @ 144 $\frac{1}{2}$ ,

5,202.00 10,949.50

Loss, \$750.50

19.

1869 yr. 11 mo. 31 da. — 1867 yr. 5 mo. 29 da. = 2 yr. 5 mo.

2 da. = 29.0 $\frac{2}{3}$  mo.\$843  $\times$  .06 = \$50.58, interest for 1 yr. $\frac{29.0\frac{2}{3} \times 29.0\frac{2}{3}}{12} =$  \$122.52, interest required.

20.

1 — 15% = 85%; and

85% of 60 lb. = 51 lb.

21.

\$6.00 (gold interest on \$100 of 5-20's)  $\times 1.27\frac{1}{2}$  = \$7.65, currency.

\$7.65 (interest)  $\div$  \$106.50 (cost) =  $.071\frac{1}{2}$  =  $7\frac{1}{2}\%$ .

22.

\$1.60, cost of quinces,  $\times 1.35$  = \$2.16, selling price of best.

\$1.60, " " "  $\times .85$  = 1.36, selling price of the others.

23.

\$1 of cost — 43%, cost of labor, = 57%, cost of materials.

\$1,480  $\times .57$  = \$843.60, cost of materials.

24.

\$1.242, cost per yard,  $\times 1.25$  = \$1.55 $\frac{1}{2}$ , selling price per yard.

\$1.55 $\frac{1}{2}$   $\div$  .92 = \$1.68 $\frac{1}{2}$ , marked " " "

25.

\$600 — \$250 = \$350, balance.

Present worth of \$1 for 3 mo., at 6%, = \$1.03.

\$350  $\div$  \$1.03 = 339.80 times = \$339.80, balance paid.

26.

16.5 bu.  $\times 11$  = 181.5 bu. raised.

181.5 bu. at \$1.60 = \$290.40, what the wheat brought.

\$290.40 — \$193.60, cost of seed and labor, = \$96.80, gain.

\$96.80  $\div$  \$193.60 = .50 time = 50%, rate of gain.

27.

\$1 face + \$.015 premium = \$1.015, cost of \$1 of draft.

\$360, cost of draft,  $\div$  \$1.015, cost of \$1 of draft, = 354.68 times  
= \$354.68, face of draft.

28.

\$2,500, cost of draft,  $\times .00\frac{1}{2}$ , rate of exchange, = \$18.75, gain on exchange.

\$2,500  $\div$  1.01 = \$2,475.25, sum to be invested.

\$2,500 — \$2,475.25 = \$24.75, commission.

\$24.75 — \$18.75 = \$6 less than grain-buyer's commission.

## 29.

\$1 — \$.013, int. of \$1 for 2 mo. 18 da., at 6%, = \$.987,  
proceeds of \$1.

\$370.12½ ÷ \$.987 = 375 times = \$375, face of note.

## 30.

Present worth of \$6,375, at 60 da., at 8%, \$6,291.12

Cost of cattle, \$4,325 + \$1,498, 5,823.00

Net gain, \$468.12

## 31.

1866 yr. 9 mo. 4 da.	Principal,	\$3,275
1866 4 23	Int. to Sept. 4, 1866,	<u>71.50</u>
4 mo. 11 da.	Amount,	\$3,346.50
1869 yr. 1 mo. 7 da.	Payment,	<u>845</u>
1866 9 4	2d principal,	\$2,501.50
2 yr. 4 mo. 8 da.	Int. to Jan. 7, 1869,	<u>351.46</u>
1869 yr. 7 mo. 1 da.	Amount " " "	\$2,852.96
1869 . . 1 7	Sum of payments,	<u>1,475</u>
5 mo. 24 da.	3d principal,	\$1,377.96
	Int. to July 1, 1869,	<u>39.96</u>
	Balance due July 1, 1869,	\$1,417.92

## 32.

\$400 Cash, March 3.

\$ 325 for 77 da. = \$ 25,025 for 1 da.

1,000 " 83 " = 83,000 " 1 "

625 " 185 " = 115,625 " 1 "

1,275 " 254 " = 323,850 " 1 "

\$3,625 " ? " = \$547,500 " 1 "

\$547,500 ÷ \$3,625 = 151 times = 151 da., average term of credit.

March 3 + 151 da. = Aug. 1.

33.

\$620.00, principal.  
20.67, interest for 5 mo., at 8%.  
 \$640.67, amount.  
314.00, payment.  
 \$326.67, new principal.  
15.24, interest for 7 mo., at 8%.  
 \$341.91, amount due at end of year.

34.

\$ 52.65 ÷ \$6,750 = .0078, rate of A's tax.  
 \$13,575 × .0078 = \$105.885, B's tax.

35.

Cost of 45 casks of 36 gal. each,	@ \$1.50 =	\$2,430.00
Transportation of 45 casks,	" 1.75 =	78.75
2% of 1,620 gal. = 32.4 gal., tare.		
Specific duty on (1,620 - 32.4 =) 1587.6 gal.,	" 1.00 =	1,587.60
1587.6 gal., @ \$1.50 =		\$2,381.40, net value.
Ad valorem duty of 25% on \$2,281.40,	=	595.35
		Cost of wine, \$4,691.70

36. \$4,522.50 ÷ 1.005 = \$4,500 = 45 shares.

37.

1869 yr. 10 mo. 25 da.	Principal, \$1,650.00
1867     11     19	Interest to Oct. 25, 1869, 223.10
1 yr. 11 mo. 6 da.	Amount, \$1,873.10
1870 yr. 3 mo. 4 da.	Sum of payments, 600.10
1869     10     25	New principal, Oct. 25, 1869, \$1,273.00
4 mo. 9 da.	Interest to March 4, 1870, 31.4
	Balance due March 4, 1870, \$1,305.4

## 38.

$\$5 \times 1.35 = \$6.75$ , currency int. on a 10-40 \$100 bond.

$\$6 \times 1.35 = \$8.10$ , " " " " 5-20 \$100 bond.

$\$6.75 \div \$97\frac{1}{4} = 6\frac{3}{4}\frac{1}{4}\% = 6.94$  on 10-40's.

$\$8.10 \div \$107\frac{1}{4} = 7\frac{1}{4}\frac{1}{4}\% = 7.52$  on 5-20's.

Hence, 5-20's are the better investment.

## 39.

Oct. 19 + 3 mo. = Jan. 19.

Nov. 4 + 30 da. = Dec. 4.

Dec. 28 + 0 " = Dec. 28.

Jan. 15 + 4 mo. = May 15.

\$ 757 Cash, Dec. 4.

1,050 for 24 da. = \$25,200 for 1 da.

375 " 46 " = 17,250 " 1 "

265 " 162 " = 42,980 " 1 "

\$2,447 for ? da. = \$85,380 for 1 da.

$\$85,380 \div \$2,447 = 35$  times = 35 da., average term of credit.

Dec. 4, 1868, + 35 da. = Jan. 8, 1869.

## 40.

Market value of \$100 of mortgage, at  $\frac{1}{4}\%$  discount = \$99.7506284.

$\$99.7506284 \div \$1.025$ , market value of \$1 of 6's of '81 =

\$97.31768, amount of 6's of '81 that can be realized for  
\$100 of mortgage.

$\$.06 \times 1.25 = \$.075 = 7\frac{1}{2}\%$ , currency value of interest on 6's  
of '81.

$\$97.32 \times .07\frac{1}{2} = \$7.299$ , interest on 6's of '81 realized from \$100  
of mortgage.

7.00, interest on \$100 of mortgage, at 7%.

Hence, I will gain .299 of 1%.

# CHAPTER VIII.

## RATIO AND PROPORTION.

### SECTION II.

#### *SIMPLE PROPORTION.*

$$1. \quad 10 : 8 :: 15 : - \quad \frac{8 \times 15}{10} = \frac{120}{10} = 12.$$

$$2. \quad 27 : - :: 12\frac{1}{2} : 5 \quad \frac{27 \times 5}{12\frac{1}{2}} = \frac{27 \times 5 \times 2}{25} = 10.8.$$

$$3. \quad 7\frac{1}{2} : 6\frac{1}{4} :: - : 5 \quad \frac{7\frac{1}{2} \times 5}{6\frac{1}{4}} \times \frac{1\cancel{5}}{2} \times \frac{\cancel{5}}{1} \times \frac{4}{\cancel{25}} = \frac{12}{2} = 6.$$

$$4. \quad - : 21 :: 15 : 35 \quad \frac{21 \times 15}{35} = 9.$$

$$5. \quad 12 : 18 :: 18 : - \quad \frac{18 \times 18}{12} = 27.$$

$$6. \quad 6 : - :: 12 : 8 \quad \frac{6 \times 8}{12} = 4.$$

$$7. \quad 4 : 7 :: - : 6 \quad \frac{4 \times 6}{7} = 3\frac{3}{7}.$$

8.

$$- : \frac{4}{3} :: \frac{5}{8} : \frac{5}{3} \quad \frac{\frac{4}{3} \times \frac{5}{8}}{\frac{5}{8}} = \frac{4}{5} \times \frac{5}{8} \times \frac{8}{3} = 1\frac{1}{3}$$

9.

$$.25 : - :: .3 : 2.4 \quad \frac{.25 \times 2.4}{.3} = \frac{.6}{.3} = 2$$

10.

$$15 : 9 :: 10 : - \quad \frac{9 \times 10}{15} = 6.$$

11.

$$53 : 29 :: \$13.25 : \$ - \\ \frac{29 \times \$13.25}{53} = \frac{\$384.25}{53} = \$7.25, \text{ cost of } 29 \text{ bu.}$$

12.

$$7 \text{ mo.} : 2 \text{ yr. } 5 \text{ mo.} :: \$315 : \$ - \\ \frac{\$315 \times 29}{7} = \$1,305, \text{ rent for } 2 \text{ yr. } 5 \text{ mo.}$$

13.

$$12\frac{1}{2} \text{ lb.} : 5\frac{1}{2} \text{ lb.} :: \$1,785 : \$ - \\ \frac{\$1,785}{1} \times \frac{11}{2} \times \frac{4}{51} = \frac{\$39.27}{51} = \$.77, \text{ cost of } 5\frac{1}{2} \text{ lb.}$$

14.

$$1 : 100 :: \$1.40 : \$ - \\ \frac{\$1.40 \times 100}{1} = \$140, \text{ value of a cental.}$$

15.

$$8 \text{ rm. } 14 \text{ quires} : 9 \text{ rm. } 2 \text{ quires} :: \$4.62\frac{1}{2} : \$ - \\ 8 \text{ rm. } 14 \text{ quires} = 74 \text{ quires; and } 9 \text{ rm. } 2 \text{ quires} = 182 \text{ quires.} \\ \frac{\$4.625 \times 182}{74} = \$11.87\frac{1}{2}, \text{ cost of } 9 \text{ rm. } 2 \text{ quires.}$$

16.

1 mi. 20 rd. 4 ft. : 23 mi. 16 rd. 12 ft. :: 401 : —

1 mi. 20 rd. 4 ft. = 5,614 ft.; and 23 mi. 16 rd. 12 ft. =  
121,716 ft.

$$\frac{401 \times 121,716 \text{ ft.}}{5,614 \text{ ft.}} = 8,694 \text{ times} = 8,694 \text{ revolutions in } 23 \text{ mi. } 16 \text{ rd. } 12 \text{ ft.}$$

17.

81 : 56 :: 271 bu. 1 pk : — bu.

$$\frac{56 \times 271\frac{1}{2} \text{ bu.}}{81} = 490 \text{ bu.}$$

18.

$$475 \text{ lb.} : 645 \text{ lb.} :: 266 \text{ lb.} : \text{— lb.} \quad \frac{266 \text{ lb.} \times 645}{475} = 361\frac{1}{2} \text{ lb.}$$

19.

3 da. 10 h. : 4 da. 3 h. :: 779 mi. : — mi.

3 da. 10 h. = 82 h.; and 4 da. 3 h. = 99 h.

$$\frac{779 \text{ mi.} \times 99}{82} = 940\frac{1}{2} \text{ mi., in } 4 \text{ da. } 3 \text{ h.}$$

20.

13½ cd. : 21.25 cd. :: \$81.75 : \$ —

$$\frac{\$81.75 \times 21.25}{13.625} = \$127.50, \text{ cost of } 21.25 \text{ cd.}$$

21.

8.7 T. : 9.75 T. :: \$73.95 : \$ —

$$\frac{\$73.95 \times 9.75}{8.7} = \$82.87\frac{1}{2}, \text{ cost of } 9.75 \text{ tons.}$$

22.

53 lb. 3 oz. : 44½ lb. :: \$6.28 : \$ —

$$\frac{\$6.28 \times 44\frac{1}{2}}{53\frac{3}{4}} = \$5.25\frac{3}{4}, \text{ cost of a cheese weighing } 44\frac{1}{2} \text{ lb.}$$



23.

1 yr. 5 mo. 22 da. : 11 mo. 12 da. :: \$46.55 : \$—

1 yr. 5 mo. 22 da. = 532 da., and 11 mo. 12 da. = 342 da.

$$\frac{\$46.55 \times 342}{532} = \$29.92\frac{1}{2}, \text{ interest for 11 mo. 12 da.}$$

24.

 $7\frac{1}{2}$  ft. : 85 ft. :: 6 ft. : — ft.

$$\frac{6 \text{ ft.} \times 85}{7.5} = 68 \text{ ft., height of tree.}$$

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### SECTION III.

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*COMPOUND PROPORTION.*

1.

$$\left. \begin{array}{l} 7 : 21 \\ 4 : 8 \end{array} \right\} :: 3 : — \quad \frac{3 \times 2}{21 \times 4} = 18$$

2.

$$\left. \begin{array}{l} 25 \text{ yd.} : — \text{ yd.} \\ 25 \text{ yd. wide} : \frac{1}{2} \text{ yd. wide} \end{array} \right\} :: \$7\frac{1}{2} : \$45$$

25

50

3

$$\frac{25 \times 25 \text{ yd. wide} \times 45}{50 \times 7.5} = 75 \text{ yd. wide.}$$

30

2

3.

$$\left. \begin{array}{l} 25 : 5 \\ 9 : 135 \end{array} \right\} :: — : 7\frac{1}{2} \quad \frac{5}{9 \times 135} = 2\frac{1}{3}$$

15

3

4.

$$\left. \begin{array}{l} - : 14 \\ 3.2 : 1\frac{3}{5} \\ 4.5 : .6 \end{array} \right\} :: 13\frac{1}{8} : 5\frac{1}{4} \quad \frac{14 \times 1.6 \times .6 \times 13.125}{3.2 \times 4.5 \times 5.25} = 2\frac{1}{2}$$

5.

$$\left. \begin{array}{l} 16 \text{ ft.} : 18 \text{ ft.} \\ 15 \text{ ft.} : 14 \text{ ft.} \end{array} \right\} :: \$40 : - \quad \frac{18 \times 14 \times \$40}{16 \times 15} = \$42$$

6.

$$\left. \begin{array}{l} 10 \text{ h.} : 16 \text{ h.} \\ 13 \text{ da.} : 39 \text{ da.} \end{array} \right\} :: 1,365 \text{ bar.} : - \text{ bar.}$$

$$\frac{16 \times 39 \times 1,365 \text{ bar.}}{10 \times 13} = 6,552 \text{ bar.}$$

7.

$$\left. \begin{array}{l} 5\frac{1}{2} \text{ rd.} : 4\frac{2}{3} \text{ rd.} \\ 7\frac{1}{4} \text{ rd.} : 9\frac{1}{8} \text{ rd.} \end{array} \right\} :: \$580 : \$-$$

$$\frac{4\frac{2}{3} \times 9\frac{1}{8} \times \$580}{5\frac{1}{2} \times 7\frac{1}{4}} = \frac{14}{3} \times \frac{55}{6} \times \frac{\$580}{1} \times \frac{2}{11} \times \frac{4}{49} = \$622.22$$

8.

$$\left. \begin{array}{l} 24 \text{ teams} : 15 \text{ teams} \\ 2,450 \text{ ft.} : 2,016 \text{ ft.} \\ 6 \text{ ft.} : 5 \text{ ft.} \end{array} \right\} :: 14 \text{ da.} : - \text{ da.}$$

$$\frac{15 \times 2,016 \times 5 \times 14 \text{ da.}}{24 \times 2,450 \times 6} = 6 \text{ da.}$$

9.

$$\left. \begin{array}{l} 360 \text{ rd.} : 276 \text{ rd.} \\ 8 \text{ rails} : 10 \text{ rails} \end{array} \right\} :: 5,280 \text{ rails} : - \text{ rails.}$$

$$\frac{276 \times 10 \times 5,280 \text{ rails}}{360 \times 8} = 5,060 \text{ rails.}$$

## SECTION IV.

*PARTNERSHIP.*

## CASE I.

## Simple Partnership.

1.

 $\$2,500 + \$4,000 = \$6,500$ , whole capital. $\$6,500 : \$2,500 :: \$1,950$  : A's share. $\$6,500 : \$4,000 :: \$1,950$  : B's share.

$$\frac{2,500 \times \$1,950}{6,500} = \$750, \text{ A's share.}$$

$$\frac{4,000 \times \$1,950}{6,500} = \$1,200, \text{ B's share.}$$

2.

 $4 \text{ mo.} + 6 \text{ mo.} + 5 \text{ mo.} = 15 \text{ mo.}$ , whole time. $15 \text{ mo.} : 4 \text{ mo.} :: \$22.50$  : A's share. $15 \text{ mo.} : 6 \text{ mo.} :: \$22.50$  : B's share. $15 \text{ mo.} : 5 \text{ mo.} :: \$22.50$  : C's share.

$$\frac{\$22.50 \times 4}{15} = \$6, \text{ A pays.}$$

$$\frac{\$22.50 \times 6}{15} = \$9, \text{ B's share.}$$

$$\frac{\$22.50 \times 5}{15} = \$7.50, \text{ C's share.}$$

3.

 $\$5,000 + \$7,500 + \$6,000 + \$4,500 = \$23,000$ , whole insurance. $\$23,000 : \$5,000 :: \$10,120$  : *Ætna*. $\$23,000 : \$7,500 :: \$10,120$  : *Home*. $\$23,000 : \$6,000 :: \$10,120$  : *Continental*. $\$23,000 : \$4,500 :: \$10,120$  : *North American*.

$$\frac{\$10,120 \times 5,000}{23,000} = \$2,200, \text{ } \textit{Ætna}.$$

$$\frac{\$10,120 \times 7,500}{23,000} = \$3,300, \text{ Home.}$$

$$\frac{\$10,120 \times 6,000}{23,000} = \$2,640, \text{ Continental.}$$

$$\frac{\$10,120 \times 4,500}{23,000} = \$1,980, \text{ North American.}$$

4.

$$\$1,800 + \$1,500 + \$1,200 = \$4,500, \text{ cost of lots.}$$

$$\$8,420 - \$4,500 = \$3,920, \text{ whole gain.}$$

$$\$4,500 : \$1,800 :: \$3,920 : \$-, \text{ A's share.}$$

$$\$4,500 : \$1,500 :: \$3,920 : \$-, \text{ B's share.}$$

$$\$4,500 : \$1,200 :: \$3,920 : \$-, \text{ C's share.}$$

$$\frac{\$3,920 \times 1,800}{4,500} = \$1,568, \text{ A's gain.}$$

$$\frac{\$3,920 \times 1,500}{4,500} = \$1,306.66\frac{2}{3}, \text{ B's gain.}$$

$$\frac{\$3,920 \times 1,200}{4,500} = \$1,045.33\frac{1}{3}, \text{ C's gain.}$$

## CASE II.

## Compound Partnership.

5.

$$\$1,500 \text{ for 9 mo.} = \$13,500 \text{ for 1 mo.}$$

$$\begin{array}{rcl} 2,500 \text{ " 6 " } & = & 15,000 \text{ " 1 " } \\ & & \hline & & \$28,500 \end{array}$$

$$\$28,500 : \$13,500 :: \$2,394 : \text{A's share.}$$

$$\$28,500 : \$15,000 :: \$2,394 : \text{B's share.}$$

$$\frac{\$2,394 \times 13,500}{28,500} = \$1,134, \text{ A's gain.}$$

$$\frac{\$2,394 \times 15,000}{28,500} = \$1,260, \text{ B's gain.}$$

## 6.

\$12,000 : \$5,500 :: \$9,360 : S's share of profits.

\$12,000 : \$4,500 :: \$9,360 : W's share of profits.

\$12,000 : \$2,000 :: \$9,360 : T's share of profits.

$$\frac{\$9,360 \times 5,500}{12,000} = \$4,290, \text{ S's profits.}$$

$$\frac{\$9,360 \times 4,500}{12,000} = \$3,510, \text{ W's profits.}$$

$$\frac{\$9,360 \times 2,000}{12,000} = \$1,560, \text{ T's profits.}$$

## 7.

$$5 \text{ days} \times 4 = 20 \text{ days.}$$

$$4 \text{ days} \times 6 = 24 \text{ days.}$$

$$8 \text{ days} \times 5 = 40 \text{ days.}$$

$$20 \text{ da.} + 24 \text{ da.} + 40 \text{ da.} = 84 \text{ da.} \quad \frac{1}{2} \text{ of } 630 \text{ bu.} = 126 \text{ bu.}$$

$$84 \text{ da.} : 20 \text{ da.} :: 126 \text{ bu.} : \text{A's share.}$$

$$84 \text{ da.} : 24 \text{ da.} :: 126 \text{ bu.} : \text{B's share.}$$

$$84 \text{ da.} : 40 \text{ da.} :: 126 \text{ bu.} : \text{C's share.}$$

$$\frac{126 \text{ bu.} \times 20}{84} = 30 \text{ bu., A's share.}$$

$$\frac{126 \text{ bu.} \times 24}{84} = 36 \text{ bu., B's share.}$$

$$\frac{126 \text{ bu.} \times 40}{84} = 60 \text{ bu., C's share.}$$

## 8.

$$\$2,800 \text{ for } 12 \text{ mo.} = \$27,600 \text{ for } 1 \text{ mo.}$$

$$1,750 \text{ " } 10 \text{ " } = 17,500 \text{ " } 1 \text{ "}$$

$$1,450 \text{ " } 15 \text{ " } = 21,750 \text{ " } 1 \text{ "}$$

$$\underline{\$66,850}$$

\$66,850 : \$27,600 :: \$472.50 : A's share of loss.

\$66,850 : \$17,500 :: \$472.50 : B's share of loss.

\$66,850 : \$21,750 :: \$472.50 : C's share of loss.

$$\frac{\$472.50 \times 27,600}{66,850} = \$152.73, \text{ A's loss.}$$

$$\frac{\$472.50 \times 17,500}{66,850} = \$123.69, \text{ B's loss.}$$

$$\frac{\$472.50 \times 21,750}{66,850} = \$195.08, \text{ C's loss.}$$

## SECTION V.

### *REVIEW PROBLEMS IN PROPORTION.*

1.

$$\begin{aligned} \$17,550 : \$1,250 :: \$6,342 : \$- \\ \frac{1,250 \times \$6,342}{17,550} = \$451.70. \end{aligned}$$

2.

$$\begin{aligned} .1875 \text{ bu.} : .875 \text{ bu.} :: \$ .30 : \$- \\ \frac{.875 \times \$ .30}{.1875} = \$1.40. \end{aligned}$$

3.

\$4 + \$5 + \$6 + \$7 = \$22, sum of proportionate shares.

\$22 : \$4 :: \$19,250 : daughter's share.

\$22 : \$5 :: \$19,250 : youngest son's share.

\$22 : \$6 :: \$19,250 : second son's share.

\$22 : \$7 :: \$19,250 : eldest son's share.

$$\frac{\$19,250 \times 4}{22} = \$3,500, \text{ daughter.}$$

$$\frac{\$19,250 \times 5}{22} = \$4,375, \text{ youngest son.}$$

$$\frac{\$19,250 \times 6}{22} = \$5,250, \text{ second son.}$$

$$\frac{\$19,250 \times 7}{22} = \$6,125, \text{ eldest son.}$$

4.

$$1\frac{1}{2} : 1\frac{1}{2} :: 2 \times 3 \times 400 \text{ ft.} : - \text{ ft.}$$

$$\frac{1.5 \times 2 \times 3 \times 400 \text{ ft.}}{1.25} = 2,880 \text{ ft.}$$

5.

$$16 \text{ mi.} + 24 \text{ mi.} + 28 \text{ mi.} + 36 \text{ mi.} = 104 \text{ mi., total distance.}$$

$$104 \text{ mi.} : 16 \text{ mi.} :: \$13 : \$-, \text{ sum the 1st paid.}$$

$$104 \text{ mi.} : 24 \text{ mi.} :: \$13 : \$-, \text{ sum the 2d paid.}$$

$$104 \text{ mi.} : 28 \text{ mi.} :: \$13 : \$-, \text{ sum the 3d paid.}$$

$$104 \text{ mi.} : 36 \text{ mi.} :: \$13 : \$-, \text{ sum the 4th paid.}$$

$$\frac{\$13 \times 16}{104} = \$2, \text{ 1st man paid.}$$

$$\frac{\$13 \times 24}{104} = \$3, \text{ 2d man paid.}$$

$$\frac{\$13 \times 28}{104} = \$3.50, \text{ 3d man paid.}$$

$$\frac{\$13 \times 36}{104} = \$4.50, \text{ 4th man paid.}$$

6.

$$\$286.25 : \$59.50 :: \$27.48 : \$-$$

$$\frac{59.50 \times \$27.48}{286.25} = \$5.712$$

7.

$$12 \times 7 \times 6 \text{ cu. ft.} : 8 \times 7 \times 4 \text{ cu. ft.} :: 405 \text{ bu.} : - \text{ bu.}$$

$$\frac{8 \times 7 \times 4 \times 405 \text{ bu.}}{12 \times 7 \times 6} = 180 \text{ bu.}$$

8.

745½ bu. : 1,677½ bu. :: 17½ cd. : — cd.

$$\frac{1677.875 \times 17.75 \text{ cd.}}{745.5} = 39.9375 \text{ cd.}$$

9.

$\frac{2}{5}$  of \$2,400 = \$ 960, C's capital for 4 mo.

$\frac{2}{5}$  of 3,200 = 2,000, D's " " 4 "

\$2,400, A's capital for first 8 mo.

960, C's purchase.

\$1,440, A's capital for last 4 mo.

\$3,200, B's capital for first 8 mo.

2,000, D's purchase.

\$1,200, B's capital for last 4 mo.

\$2,400 for 8 mo.	= \$19,200 for 1 mo.	}	= \$24,960, A's proportionate share.
1,440 " 4 "	= 5,760 " 1 "		
3,200 " 8 "	= 25,600 " 1 "	}	= 30,400, B's proportionate share.
1,200 " 4 "	= 4,800 " 1 "		
960 " 4 "	= 3,840 " 1 "	}	= 3,840, C's proportionate share.
2,000 " 4 "	= 8,000 " 1 "		
		}	= 8,000, D's proportionate share.

Total proportionate capital, \$67,200.

\$67,200 : \$24,960 :: \$5,040 : A's share of profits.

\$67,200 : \$30,400 :: \$5,040 : B's " " "

\$67,200 : \$3,840 :: \$5,040 : C's " " "

\$67,200 : \$8,000 :: \$5,040 : D's " " "

$$\frac{24,960 \times \$5,040}{67,200} = \$1,872, \text{ A's profits.}$$

$$\frac{30,400 \times \$5,040}{67,200} = \$2,280, \text{ B's profits.}$$

$$\frac{3,840 \times \$5,040}{67,200} = \$288, \text{ C's profits.}$$

$$\frac{8,000 \times \$5,040}{67,200} = \$600, \text{ D's profits.}$$



## 10.

1,500 bar. : 700 bar. :: 195 bar. : A's loss.

1,500 bar. : 200 bar. :: 195 bar. : B's loss.

1,500 bar. : 600 bar. :: 195 bar. : C's loss.

$$\frac{700 \times 195 \text{ bar.}}{1,500} = 91 \text{ bar., A's share of loss.}$$

$$\frac{200 \times 195 \text{ bar.}}{1,500} = 26 \text{ bar., B's share of loss.}$$

$$\frac{600 \times 195 \text{ bar.}}{1,500} = 79 \text{ bar., C's share of loss.}$$

# CHAPTER IX. EVOLUTION.

## SECTION II.

### *EXTRACTION OF SQUARE ROOT.*

1.	2.	3.	4.
$\begin{array}{r l} 54 \cdot 76 & 74 \\ 49 & \\ \hline 576 & 144 \\ 576 & \hline \end{array}$	$\begin{array}{r l} 75 \cdot 69 & 8 \cdot 7 \\ 64 & \\ \hline 1169 & 167 \\ 1169 & \hline \end{array}$	$\begin{array}{r l} .02 \cdot 89 & .17 \\ 1 & \\ \hline 189 & 27 \\ 189 & \hline \end{array}$	$\begin{array}{r l} 9 \cdot 76 \cdot 16 & 296 \\ 4 & \\ \hline 476 & 49 \\ 441 & \\ \hline 3516 & 586 \\ 8516 & \hline \end{array}$
Hence,	Hence,	Hence,	
$\sqrt{5,476} = 74.$	$\sqrt{75.69} = 8.7.$	$\sqrt{.0289} = .17.$	

Hence,  $\sqrt{87,616} = 296.$

5.	6.	7.
$\begin{array}{r l} 88 \cdot 17 \cdot 21 & 939 \\ 81 & \\ \hline 717 & 183 \\ 549 & \\ \hline 16821 & 1869 \\ 16821 & \hline \end{array}$	$\begin{array}{r l} .45 \cdot 56 \cdot 25 & .675 \\ 36 & \\ \hline 956 & 127 \\ 889 & \\ \hline 6725 & 1345 \\ 6725 & \hline \end{array}$	$\begin{array}{r l} 50 \cdot 80 \cdot 83 \cdot 84 & 7128 \\ 49 & \\ \hline 180 & 140 \\ 141 & \\ \hline 3983 & 1422 \\ 2844 & \\ \hline 113984 & 14248 \\ 113984 & \hline \end{array}$
Hence,	Hence,	
$\sqrt{881,721} = 939.$	$\sqrt{.455625} = .675.$	

Hence,  $\sqrt{50,808,384} = 7,128.$

8.	9.	10.
$\begin{array}{r l} 13 \cdot 87 \cdot 56 \cdot 25 & 37.25 \\ 9 & \\ \hline 487 & 67 \\ 469 & \\ \hline 18'56 & 742 \\ 1484 & \\ \hline 37225 & 7445 \\ 37225 & \hline \end{array}$	$\begin{array}{r l} .00 \cdot 01 \cdot 69 & .013 \\ 1 & \\ \hline 69 & 23 \\ 69 & \hline \end{array}$	$\begin{array}{r l} 3 \cdot 61 & 19 \quad 5 \cdot 76 & 24 \\ 1 & \quad 4 & \\ \hline 261 & 29 \quad 176 & 44 \\ 261 & \quad 176 & \hline \end{array}$
	Hence, $\sqrt{.000169} = .013.$	Hence, $\sqrt{\frac{1}{16}} = \frac{1}{4}.$

Hence,  $\sqrt{1387.5625} = 37.25 = 37.25 \text{ ft.}$

11.

$$\begin{array}{r}
 8 \cdot 24 \overline{) 18} \\
 1 \phantom{00} \phantom{00} \\
 \hline
 224 \phantom{00} \overline{) 28} \\
 224 \phantom{00} \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 8 \cdot 41 \overline{) 29} \\
 4 \phantom{00} \phantom{00} \\
 \hline
 441 \phantom{00} \overline{) 49} \\
 441 \phantom{00} \\
 \hline
 \end{array}$$

Hence,  $\sqrt{\frac{824}{441}} = \frac{18}{21} = \frac{2}{3}$ .

12.

$$\begin{array}{r}
 180\frac{2}{3} \div 6 = 30\frac{2}{3} \\
 1 \cdot 96 \overline{) 14} \\
 1 \phantom{00} \phantom{00} \\
 \hline
 96 \phantom{00} \overline{) 24} \\
 96 \phantom{00} \\
 \hline
 \end{array}
 \quad
 \sqrt{9} = 3$$

Hence,  $\sqrt{\frac{196}{9}} = \frac{14}{3} = 4\frac{2}{3} = 4\frac{2}{3} \text{ in.}$

13.

$$\begin{array}{r}
 911\frac{1}{11} = 13\frac{225}{11} \\
 1 \cdot 32 \cdot 25 \overline{) 115} \\
 1 \phantom{00} \phantom{00} \\
 \hline
 32 \phantom{00} \overline{) 21} \\
 21 \phantom{00} \\
 \hline
 1125 \phantom{00} \overline{) 225} \\
 1125 \phantom{00} \\
 \hline
 \end{array}
 \quad
 \sqrt{144} = 12$$

Hence,  $\sqrt{\frac{18225}{144}} = \frac{115}{12} = 9\frac{7}{12}$ .

14.

$$\begin{array}{r}
 15 \phantom{00} \overline{) 3.872 +} \\
 9 \phantom{00} \phantom{00} \\
 \hline
 6'00 \phantom{00} \overline{) 68} \\
 544 \phantom{00} \\
 \hline
 5600 \phantom{00} \overline{) 767} \\
 5869 \phantom{00} \\
 \hline
 23100 \phantom{00} \overline{) 7742} \\
 15484 \phantom{00} \\
 \hline
 \end{array}$$

Hence,  $\sqrt{15} = 3.872 +$ .

15.

$$\begin{array}{r}
 99 \phantom{00} \overline{) 9.9498 +} \\
 81 \phantom{00} \phantom{00} \\
 \hline
 18'00 \phantom{00} \overline{) 189} \\
 17 \phantom{00} \phantom{00} \\
 \hline
 9900 \phantom{00} \overline{) 1984} \\
 7936 \phantom{00} \\
 \hline
 196400 \phantom{00} \overline{) 19889} \\
 179001 \phantom{00} \\
 \hline
 1739900 \phantom{00} \overline{) 198988} \\
 1691904 \phantom{00} \\
 \hline
 \end{array}$$

Hence,  $\sqrt{99} = 9.9498 +$ .

16.

$$\begin{array}{r}
 11 \cdot 27 \cdot 75 \cdot 07 \cdot 24 \phantom{00} \overline{) 33.582} \\
 9 \phantom{00} \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\
 \hline
 227 \phantom{00} \phantom{00} \phantom{00} \phantom{00} \overline{) 63} \\
 189 \phantom{00} \phantom{00} \phantom{00} \phantom{00} \\
 \hline
 3875 \phantom{00} \phantom{00} \phantom{00} \overline{) 665} \\
 3325 \phantom{00} \phantom{00} \phantom{00} \\
 \hline
 55007 \phantom{00} \phantom{00} \overline{) 6708} \\
 53664 \phantom{00} \phantom{00} \\
 \hline
 134324 \phantom{00} \overline{) 67162} \\
 134324 \phantom{00} \\
 \hline
 \end{array}$$

Hence,  $\sqrt{1127.750724} = 33.582$ .

# SECTION III.

## EXTRACTION OF CUBE ROOT.

1.

$$\begin{array}{r|l} 103823 & 47 \\ 64 & \\ \hline 39823 & 4800 + 840 + 49 \\ 39823 & 5689 \end{array}$$

$$\begin{array}{r|l} 24389 & 29 \\ 8 & \\ \hline 16389 & 1200 + 540 + 81 \\ 16389 & 1821 \end{array}$$

Hence,  $\sqrt[3]{103,823} = 47$ ; and  $\sqrt[3]{24,389} = 29$ .

2.

$$\begin{array}{r|l} 274.625 & 6.5 \\ 216 & \\ \hline 58'625 & 10800 + 900 + 25 \\ 58\ 625 & 11725 \end{array}$$

3.

$$\begin{array}{r|l} .000729 & .09 \\ 729 & \\ \hline \end{array}$$

Hence,  $\sqrt[3]{.000729} = .09$ .

Hence,  $\sqrt[3]{274.625} = 6.5$ .

4.

2 cu. ft. 1,457 cu. in. = 4,913 cu. in.

$$\begin{array}{r|l} 4913 & 17 = 17 \text{ in.} = 1 \text{ ft. } 5 \text{ in.} \\ 1 & \\ \hline 3913 & 300 + 210 + 49 \\ 3913 & 559 \end{array}$$

5.

$$\begin{array}{r|l} 10218313 & 217 \\ 8 & \\ \hline 2218 & 1200 + 60 + 1 \\ 1261 & 1261 \\ \hline 957313 & 132300 + 4410 + 49 \\ 957313 & 136759 \end{array}$$

Hence,  $\sqrt[3]{10,218,313} = 217$ .

6.

$$\begin{array}{r|l} 181096512 & 508 \\ 125 & \\ \hline 6096512 & 750000 + 12000 + 64 \\ 6096512 & 762064 \end{array}$$

Hence  $\sqrt[3]{181,096,512} = 508$ .

7.

$$13\frac{1}{2} \text{ cu. ft.} = 23,328 \text{ cu. in.}$$

$$23328 \text{ cu. in.} \div 32 = 729 \text{ cu. in.}$$

$$\sqrt[3]{729} = 9 = 9 \text{ in.}; \text{ and } 9 \text{ in.} \times 32 = 288 \text{ in.} = 24 \text{ ft.}$$

Hence, 24 ft. long and 9 in. square.

8.

$$4 \times 6 = 24. \quad 192 \text{ cu. yd.} \div 24 = 8 \text{ cu. yd.} = 216 \text{ cu. ft.}$$

$$\sqrt[3]{216} = 6.$$

Hence, 6 ft.; 4 times 6 ft., or 24 ft.; and 6 times 6 ft., or 36 ft.

9.

187·149·248	57.2
125	
62149	7500 + 1050 + 49
60193	8599
1956·248	974700 + 8420 + 4
1956 248	978124

$$\text{Hence, } \sqrt[3]{187149.248} = 57.2.$$

10.

118·805·247·296	4916
64	
54805	4800 + 1080 + 81
53649	5961
1156247	720300 + 1470 + 1
721771	721771
434476296	7234800 + 88380 + 36
434476296	72412716

$$\text{Hence, } \sqrt[3]{118,805,247,296} = 4,916.$$

11.

$$270 \times 2150.4 \text{ cu. in.} = 580,608 \text{ cu. in.} = 386 \text{ cu. ft.}$$

$$3 \times 1\frac{1}{2} = 5.25, \text{ and } 386 \div 5.25 = 64.$$

$$\sqrt[3]{64} = 4 = 4 \text{ ft.}$$

$$3 \times 4 \text{ ft.} = 12 \text{ ft., and } 1\frac{1}{2} \times 4 \text{ ft.} = 7 \text{ ft.}$$

Hence, the dimensions are 7 ft., 12 ft., and 4 ft.

12.

$$\frac{8}{848} = \frac{2 \times 2 \times 2}{7 \times 7 \times 7} \text{ and } \frac{125}{2197} = \frac{5 \times 5 \times 5}{13 \times 13 \times 13}.$$

Hence,  $\sqrt[3]{\frac{8}{848}} = \frac{2}{7}$ , and  $\sqrt[3]{\frac{125}{2197}} = \frac{5}{13}$ .

13.

$$16\frac{656}{1331} = \frac{21252}{1331}, \text{ and } 4\frac{12}{125} = \frac{512}{125}.$$

Hence,  $\sqrt[3]{\frac{21252}{1331}} = \frac{28}{11} = 2\frac{6}{11}$ , and  $\sqrt[3]{\frac{512}{125}} = \frac{8}{5} = 1.6$ .

14.

$$1 \text{ bu.} = 2150.42 \text{ cu. in.} \quad \sqrt[3]{2150.42} = 12.907 + = 12.907 \text{ in.}$$

$$1 \text{ gal.} = 231 \text{ cu. in.} \quad \sqrt[3]{231} = 6.135 + = 6.135 \text{ in.}$$

Hence, the interior measurement of the side of a cubical box, to hold 1 bushel of grain, must be 12.907 inches; and of the one to hold 1 gallon of oil, 6.135 inches.

# CHAPTER X.

## PROGRESSIONS.

### SECTION II.

#### *ARITHMETICAL PROGRESSION.*

6.  $5 + (7 \times 12) = 89$ , greater extreme.

7.  $19 + (3 \times 56) = 187$ , greater extreme.

8.

$21 \text{ yr.} - 14 \text{ yr.} = 7 \text{ yr.}$

$\$50 + (6 \times \$75) = \$500$ , greater extreme.

9.  $215 - (13 \times 14) = 33$ , less extreme.

10.

$\$1,000 - (17 \times \$20) = \$660$ , price for lot farthest from city.

11

$$\frac{249 - 13}{60 - 1} = 4, \text{ common difference.}$$

12.

$$\frac{\$484 - \$16}{53 - 1} = \$9, \text{ average weekly deposits.}$$

13.

$$\frac{67\frac{3}{4} - 4\frac{3}{4}}{1\frac{1}{2}} + 1 = 46, \text{ number of terms.}$$

14.

$$\frac{100\% - 16\%}{7\%} + 1 = 13, \text{ number of years.}$$

15.

$$\frac{1000 + 1}{2} \times 1,000 = 500,500, \text{ sum of the series.}$$

16.

$$\frac{1 + 12}{2} \times 12 = 78 = 78 \text{ strokes.}$$

$$17. \frac{1}{2} + (\frac{1}{2} \times 49) = 16\frac{5}{8}, \text{ greater extreme.}$$

$$18. \$25 + (51 \times \$5) = \$280. \quad 19. 90\frac{2}{3} - (83 \times \frac{2}{3}) = 35\frac{1}{3}.$$

20.

$$(244 - 13) \div 33 = 7.$$

$$13 + 7 = 20, \text{ first mean.}$$

$$244 - 7 = 237, \text{ last mean.}$$

21.

$$\frac{300 - 16\frac{1}{2}}{3\frac{1}{2}} + 1 = 82, \text{ number of terms.}$$

Hence, 82 rods.

22.

$$19\frac{5}{12} + (\frac{4}{12} \times 99) = 52\frac{5}{12}, \text{ last term.}$$

$$\frac{19\frac{5}{12} + 52\frac{5}{12}}{2} \times 100 = 3,591\frac{2}{3}, \text{ sum.}$$

## SECTION III.

## GEOMETRICAL PROGRESSION.

6.

$$3^8 \times 7 = 1,701.$$

7.

$$4^{7-1} \times 13 = 53,248.$$

8.

$$\frac{5,625}{5^{5-1}} = 9.$$

9.

$$\frac{845824}{2^{12-1}} = 413.$$

10.

$$\sqrt[5-1]{\frac{64}{4}} = \sqrt[4]{\frac{64}{4}} = 2.$$



11.

$$\sqrt[4]{\frac{2744}{8}} = 7.$$

$$8 \times 7 = 56; 56 \times 7 = 392.$$

Hence, the proportion is,

$$8 : 56 :: 392 : 2,744.$$

12.

$$\begin{array}{r} 234975 \mid 3 \\ \hline \end{array}$$

$$\begin{array}{r} 78125 \mid 5 \\ \hline \end{array}$$

$$\begin{array}{r} 15625 \mid 5 \\ \hline \end{array}$$

$$\begin{array}{r} 3125 \mid 5 \\ \hline \end{array}$$

$$\begin{array}{r} 625 \mid 5 \\ \hline \end{array}$$

$$\begin{array}{r} 125 \mid 5 \\ \hline \end{array}$$

$$\begin{array}{r} 25 \mid 5 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \mid 5 \\ \hline \end{array}$$

$$1$$

Hence, 8 terms.

13.

$$\begin{array}{r} \frac{1}{729} \mid \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{243} \mid \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{81} \mid \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{27} \mid \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{9} \mid \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{3} \mid \frac{1}{3} \\ \hline \end{array}$$

$$1$$

Hence, 7 terms.

14.

$$\frac{(4374 \times 3) - 2}{3 - 1} = 6,560.$$

15.

$$2 \times 5^8 = 781,250, \text{ last term.}$$

$$\frac{(781250 \times 3) - 2}{5 - 1} = 976,562, \text{ sum of series.}$$

16.

$$\$0.01 \times 3^{13-1} = \$1,771.47, \text{ last term; and}$$

$$\frac{(\$1,771.47 \times 3) - 1}{3 - 1} = \$2,657.20.$$

$$17. \$0.01 \times 2^{47} = \$2,814,749,767,106.56.$$

18.

$$\frac{(18 \times 3) - 0}{3 - 1} = 27.$$

$$\begin{array}{c} 19. \\ \frac{(100 \times 4) - 0}{3} = 133\frac{1}{3}. \end{array}$$

$$\begin{array}{c} 20. \\ \frac{1 \times 2}{1} = 2. \end{array}$$

## SECTION IV.

### *INTEREST BY PROGRESSIONS.*

$$\begin{array}{c} 1. \\ \$500 + (8 \times \$35) = \$780, \text{ at } 7\%. \\ \$500 + (8 \times \$30) = \$740, \text{ at } 6\%. \end{array}$$

$$\begin{array}{c} 2. \\ \$50 + (8 \times \$3) = \$74, \text{ last term.} \\ \frac{\$50 + \$74}{2} \times 9 = \$558, \text{ sum to be paid.} \end{array}$$

$$\begin{array}{c} 3. \\ \$150 + (9 \times \$15) = \$285, \text{ last term.} \\ \frac{\$150 + \$285}{2} \times 10 = \$2,175, \text{ amount of savings in 10 years.} \end{array}$$

$$\begin{array}{c} 4. \\ \$100 + (9 \times \$6) = \$154, \text{ last term.} \\ \frac{\$100 + \$154}{2} \times 10 = \$1,270, \text{ sum due.} \end{array}$$

$$\begin{array}{c} 5. \\ \$300 + (6 \times \$24) = \$444, \text{ last term.} \\ \frac{\$300 + \$444}{2} \times 7 = \$2,604, \text{ amount of annuity in 6 years.} \end{array}$$

Present worth of \$2,604, due in 6 years, at 8%, is  
 $\$2,604 \div 1.48 = \$1,759.45.$

6.

$$\$600 + (4 \times \$86) = \$744, \text{ last term.}$$

$$\frac{\$600 + \$744}{2} \times 5 = \$3,360, \text{ amount of rent in 6 years.}$$

Present worth of \$3,360, due in 5 years, at 6%, is

$$\$3,360 \div 1.30 = \$2,584.62.$$

7.

$$\$400 + (4 \times \$40) = \$560, \text{ last term.}$$

$$\frac{\$400 + \$560}{2} \times 5 = \$2,400, \text{ sum that can be borrowed.}$$

Present worth of \$2,400, in 8 years, at 10% discount, is

$$\$2,400 \div .80 = \$1,333.33\frac{1}{3}.$$

8.

$$\$1,000 + (\$1,000 \times .08 \times 6) = \$1,480, \text{ last term.}$$

$$\frac{\$1,000 + \$1,480}{2} \times 7 = \$8,680, \text{ amount of annuity in 7 years.}$$

Present worth of \$8,680 due in 11 yr. at 8% is

$$\$8,680 \div 1.88 = \$4,020.$$

9.

$\$1,500 \div .06 = \$25,000$ , present worth of annuity to commence immediately.

Present worth of \$25,000 due in 7 years, at 6%, is

$$\$25,000 \div 1.42 = \$17,605.63.$$

$$10. \$10,000 \times 1.06^5 = \$13,382.255, \text{ amount.}$$

11.

$$\$425 \times 1.07^5 = \$596.08, \text{ amount.}$$

$$\$596.08 - \$425 = \$171.08, \text{ compound interest.}$$

12.

5% per annum is  $1\frac{1}{4}\%$  per quarter; and  
3 years are 12 quarters.

$$\$500 \times 1.0125^{12} = \$580.89, \text{ amount.}$$

$$13. \$89.54 \div 1.06^4 = \$70.92, \text{ principal.}$$

$$14. \$32,153.83 \div 1.10^5 = \$15,000, \text{ principal.}$$

15.

$\$185 \times 1.07^3 = \$226.63$ , greater extreme.

$\frac{(\$226.63 \times 1.07) - \$185}{.07} = \$821.39$ , sum of series, and amount of annuity.

16.

$\$75 \times 1.03^4 = \$92.24$ , greater extreme, and amount of first deposit.

$\frac{(\$92.24 \times 1.03) - \$75}{.03} = \$666.93$ , amount to his credit at the end of 4 years.

17.

$\$1,200 \times 1.05^{10} = \$1,861.594$ , greater extreme, and amount of first year's annuity.

$\frac{(\$1,861.594 \times 1.05) - \$1,200}{.05} = \$15,093.47$ , amount of annuity in 10 years.

# CHAPTER XI.

## MENSURATION.

### SECTION II.

#### *MENSURATION OF LINES.*

1.  $\sqrt{117^2 + 156^2} = 195 = 195 \text{ rd.}$

2.

$$12^2 + 9^2 = 225; \sqrt{225} = 15 = 15 \text{ in.}; \text{ and}$$

$$15 \text{ in.} \times 16 = 240 \text{ in.} = 20 \text{ ft.}$$

3.

$$24 \text{ ft.} \div 2 = 12 \text{ ft.}$$

$$12^2 + 9^2 = 225; \sqrt{225} = 15 = 15 \text{ ft.}; \text{ and}$$

$$15 \text{ ft.} + 1 \text{ ft. } 6 \text{ in.} = 16 \text{ ft. } 6 \text{ in.}$$

4.  $\sqrt{39^2 + 15^2} = 36$ . Hence, 36 ft.

5.  $\sqrt{164^2 - 36^2} = 160$ . Hence, 160 ft.

6.  $\sqrt{48^2 + 64^2} = 80$ . Hence, 80 feet.

7.

$$\sqrt{\frac{50^2}{2}} = \sqrt{1250} = 35.35 +. \text{ Hence, } 35.35 + \text{ ft.}$$

8.

5 ft. 10 in. = 70 in., height of cylinder.

70 in.  $\div$  14 = 5 in., vertical distance between coils of string.

1 ft. = 12 in., length of base.

$\sqrt{12^2 + 5^2} = 13 = 13 \text{ in.}$ , length of string in 1 coil.

13 in.  $\times$  14 = 182 in., or 15 ft. 2 in., whole length of string.

9.

21.8 in., hypotenuse.

$\frac{1}{2}$  of 2.64 in. = 1.32 in., base of triangle.

$\sqrt{21.8^2 - 1.32^2} = 21.76 = 21.76$  in., height of cone.

10.

$$\sqrt{45^2 + 60^2} = 75$$

$$\sqrt{45^2 + 108^2} = 117$$

$$\sqrt{45^2 + 200^2} = 205$$

Hence, 75 ft., 117 ft., and 205 ft.

11. 8 ft.  $\times$  3.1416 = 25.1328 ft.

12. 5 ft.  $\times$  3.1416 = 15.708 ft.

13. 721 rd.  $\times$  3.1416 = 2265.1 rd.

14. 32 in.  $\times$  3.1416 = 8 ft.  $4\frac{1}{2}$  in.

15. 33 rd.  $\div$  3.1416 =  $10\frac{1}{2}$  rd.

16.

3 ch. 20 l. = 320 l.

$320 \text{ l.} \div 3.1416 = 101.8 + \text{l.} = 1 \text{ ch. } 1.8 + \text{l.}$

17.

12 minutes are  $\frac{1}{5}$  of 60 minutes.

19 in.  $\times$  5 = 95 in., circumference of dial-plate.

— in. : 95 in. :: 113 : 355.

$\frac{25 \times 113}{355} = 30\frac{1}{11} = 30\frac{1}{11}$  in., diameter of dial.

$\frac{1}{5}$  of the diameter =  $15\frac{1}{11}$  in., length of minute-hand.

## SECTION III.

*MENSURATION OF SURFACES.*

$$1. \quad \frac{8 \times 12 \text{ sq. in.}}{2} = 48 \text{ sq. in.}$$

$$2. \quad \frac{8 \times 32 \text{ sq. ft.}}{2} = 128 \text{ sq. ft.}$$

$$3. \quad \frac{2861\frac{1}{2} \text{ sq. in.} \times 2}{97 \text{ sq. in.}} = 59 \text{ times} = 4 \text{ ft. 11 in.}$$

$$4. \quad 225 \text{ sq. ft.} \times 96 = 22,308 \text{ sq. ft.}$$

$$5. \quad \frac{9 + 17}{2} \times 13 \text{ sq. in.} = 169 \text{ sq. in.} = 1 \text{ sq. ft. 25 sq. in.}$$

$$6. \quad \frac{16 \text{ in.} + 8 \text{ in.}}{2} = 1 \text{ ft., and } 12 \times 1 \text{ sq. ft.} = 12 \text{ sq. ft.}$$

$$7. \quad 20^2 \times .7854 = 314.16 = 314.16 \text{ sq. ft.}$$

$$8. \quad \begin{aligned} 11 \text{ ft.} \times 2 &= 22 \text{ ft., diameter.} \\ 22^2 \times .7854 &= 380.1336 = 380.1336 \text{ sq. ft.} \end{aligned}$$

$$9. \quad \sqrt{\frac{196}{.7854}} = \sqrt{249.5543} = 15.79 = 15.79 \text{ in.}$$

$$10. \quad 15^2 \times .7854 \times 4 = 706.86 = 706.86 \text{ sq. in.}$$

$$11. \quad \begin{aligned} 4 \text{ sq. in.} \times 4 &= 16 \text{ sq. in., area of base.} \\ 4 \text{ in.} + 4 \text{ in.} + 4 \text{ in.} + 4 \text{ in.} &= 16 \text{ in., perimeter of base.} \\ \frac{16 \text{ sq. in.}}{2} \times 11 &= 88 \text{ sq. in., area of sides.} \\ 88 \text{ sq. in.} + 16 \text{ square in.} &= 104 \text{ sq. in., entire area.} \end{aligned}$$

12.

$$\frac{40 \text{ sq. in.}}{2} \times 38 = 760 \text{ sq. in.} = 5 \text{ sq. ft. } 40 \text{ sq. in.}$$

13.

$$\begin{aligned} 18 \text{ ft.} &= 216 \text{ in.} \\ 21 \text{ in.} \times 4 &= 84 \text{ in., perimeter of one end.} \\ 216 \text{ sq. in.} \times 84 &= 18,144 \text{ sq. in., area of sides.} \\ 21 \text{ sq. in.} \times 21 \times 2 &= 882 \text{ sq. in., area of ends.} \\ 18,144 \text{ sq. in.} + 882 \text{ sq. in.} &= 19,026 \text{ sq. in.; and} \\ 19,026 \text{ sq. in.} &= 132 \text{ sq. ft. } 18 \text{ sq. in., area required.} \end{aligned}$$

14.

$$\begin{aligned} 14 \text{ in.} : - \text{ in.} :: 113 : 355 & \quad \frac{14 \text{ in.} \times 355}{113} = 44 \text{ in., circumference.} \\ 30 \text{ ft.} &= 360 \text{ in.} \\ 360 \text{ sq. in.} \times 44 &= 15,840 \text{ sq. in., convex surface.} \\ 14^2 \times .7854 \text{ sq. in.} \times 2 &= 307.8768 \text{ sq. in., area of base.} \\ 15,840 \text{ sq. in.} + 307.88 \text{ sq. in.} &= 16,147.88 \text{ sq. in.} \\ 16,147.88 \text{ sq. in.} &= 112 \text{ sq. ft. } 20 \text{ sq. in., required area.} \end{aligned}$$

15.

$$\begin{aligned} \text{Top and bottom, } 6 \text{ ft. } 6 \text{ in.} + 2 \text{ in. by } 4 \text{ ft. } 2 \text{ in., or } 80 \text{ in. by } 50 \text{ in.} \\ \text{Sides, } 6 \text{ ft. } 6 \text{ in.} + 2 \text{ in. by } 3 \text{ ft. } 2 \text{ in., or } 80 \text{ in. by } 38 \text{ in.} \\ \text{Ends, } 4 \text{ ft. } 2 \text{ in. by } 3 \text{ ft. } 2 \text{ in., or } 50 \text{ in. by } 38 \text{ in.} \\ 80 \text{ sq. in.} \times 50 \times 2 &= 8,000 \text{ sq. in. in top and bottom.} \\ 80 \text{ sq. in.} \times 38 \times 2 &= 6,080 \text{ sq. in. in two sides.} \\ 50 \text{ sq. in.} \times 38 \times 2 &= 3,800 \text{ sq. in. in two ends.} \\ \text{Amount of lumber, } 17,880 \text{ sq. in.} &= 124\frac{1}{2} \text{ sq. ft.} \end{aligned}$$

16.

$$\begin{aligned} 3 \text{ mi.} \times 7 &= 21 \text{ mi., distance one travels south.} \\ 4 \text{ mi.} \times 7 &= 28 \text{ mi., distance the other travels west.} \\ \sqrt{21^2 + 28^2} &= 35 = 35 \text{ mi., length of diagonal.} \\ 35 \text{ mi.} \div 8\frac{1}{2} \text{ mi.} &= 10 \text{ times} = 10 \text{ h.; and} \\ 7 \text{ h.} + 10 \text{ h.} &= 17 \text{ h., time.} \\ \frac{28 \text{ sq. mi.} \times 21}{2} &= 294 \text{ sq. mi. traveled round.} \end{aligned}$$



## SECTION IV.

*MENSURATION OF CAPACITIES.*

1.

$$\frac{16 \times 20 \text{ sq. in.}}{2} = 160 \text{ sq. in., area of base.}$$

$$20 \text{ ft.} = 240 \text{ in., length of prism.}$$

$$160 \times 240 \text{ cu. in.} = 38,400 \text{ cu. in.} = 22\frac{2}{3} \text{ cu. ft.}$$

2.

$$(17\frac{1}{2})^2 \times .7854 \text{ sq. in.} = 240.53 \text{ sq. in., area of end of log.}$$

$$31 \text{ ft.} = 372 \text{ in.}$$

$$240.53 \text{ cu. in.} \times 372 = 84476.67 \text{ cu. in.} = 51.78 + \text{cu. ft.}$$

3.

$$6^2 \times .7854 \times 8 \text{ cu. ft.} = 226.1952 \text{ cu. ft.}$$

$$226.1952 \text{ cu. ft.} = 890865.30 \text{ cu. in.}$$

$$890865.30 \text{ cu. in.} \div 231 \text{ cu. in.} = 1692.05 \text{ times} = 1692.05 \text{ gal.}$$

$$1692.05 \text{ gal.} = 26 \text{ hhd. } 54.05 \text{ gal.}$$

4.

$$78 \text{ cu. ft.} \times \frac{19.5}{3} = 507 \text{ cu. ft.}$$

5.

$$7^2 \times .7854 \text{ sq. ft.} = 38.4846 \text{ sq. ft., area of base.}$$

$$\frac{38.4846 \text{ cu. ft.} \times 16.75}{8} = 214.87 \text{ cu. ft.}$$

$$6. 13^2 \times .7854 \text{ cu. in.} \times 13 \times \frac{2}{3} = 1150.35 \text{ cu. in.}$$

7.

$$\frac{65.45}{\frac{2}{3} \text{ of } .7854} = 125; \text{ and } \sqrt[3]{125} = 5 = 5 \text{ in.}$$

8.

$$1^3 : 5^3 :: \frac{2}{14} \text{ lb.} : - \text{ lb.}$$

$$\frac{2}{14} \text{ lb.} \times 5^3 = \frac{25}{14} \text{ lb.} = 26\frac{1}{4} \text{ lb.}$$

9.

$$4^3 : 7^3 :: 9 \text{ lb.} : - \text{lb.}$$

$$\frac{9 \text{ lb.} \times 343}{64} = 481\frac{1}{4} \text{ lb.}$$

10.

18 in. = 1.5 ft., and 16 in. =  $1\frac{1}{3}$  or  $\frac{4}{3}$  ft.

$$1.5 \text{ cu. ft.} \times 1.5 \times 3 = 6.75 \text{ cu. ft., solidity of pedestal.}$$

$$\frac{4}{3} \text{ cu. ft.} \times \frac{4}{3} \times 7 = 4.148 \text{ " " solidity of pyramid.}$$

$$10.898 \text{ cu. ft., solidity of monument.}$$

10.898 cu. ft. @ \$16.25 = \$177.09, cost of monument.

11.

8 cu. in.  $\times 8 \times 8 = 512$  cu. in., capacity of box.

57.75 cu. in.  $\times 3\frac{1}{4} = 216.56$  cu. in. in  $3\frac{1}{4}$  qt. of water.

512 cu. in. — 216.56 cu. in. = 295.44 cu. in. in chain.

12.

50 cu. ft.  $\times \frac{7}{12} \times \frac{12}{12} = 24.3$  cu. ft., timber measure.

24.3  $\times 12$  sq. ft. = 291.6 sq. ft., board measure.

13.

$\frac{15 \text{ in.} + 10 \text{ in.}}{2} = 12\frac{1}{2} \text{ in., or } 1\frac{1}{8} \text{ ft., average thickness.}$

18 cu. ft.  $\times 1 \times 1\frac{1}{8} = 18\frac{1}{8}$  cu. ft., timber measure.

18 sq. ft.  $\times 1 \times 12\frac{1}{2} = 222$  sq. ft., board measure.

14.

• 24 inches square = 576 sq. in.

$\frac{1}{2}$  of 576 sq. in. = 288 sq. in.

$\sqrt{288} = 16.97 + = 17$  inches, nearly.

15.

24 sq. ft.  $\times 32 \times 1\frac{1}{4} \times 2 = 1,920$  sq. ft., board measure.

1,920  $\times \$40 = \$76.80.$

16. 18 sq. ft.  $\times \frac{3}{4} \times 1\frac{1}{2} \times 9 = 131\frac{1}{4}$  sq. ft.

17.

20 hhd. = 1,260 gal. = 291,060 cu. in.

5 ft. 10 in. = 70 in., and  $70^2 \times .7854$  sq. in. = 3848.46 sq. in.,  
area of base.291,060 cu. in.  $\div$  3848.46 = 75.63 times = 75.63 in., or 6 ft.  
8.63 + in.

18.

8 rd. + 2 ft. 6 in. + 4 rd. + 2 ft. 6 in. + 5 ft. = 12 rd. 10 ft. =  
208 ft., length of walk.208 sq. ft.  $\times$  5  $\times$  2 = 2,080 sq. ft. of lumber.

2,080 ft. @ \$16 per M. = \$33.28, cost of plank.

19.

8 ft. 7 in. =  $8\frac{7}{8}$  ft.; $8\frac{7}{8}$  cu. ft.  $\times$   $12\frac{3}{4}$   $\times$  5.4 =  $1\frac{93}{128}$  cu. ft.  $\times$   $\frac{3}{8}$   $\times$   $\frac{5}{16}$  =

587.1 cu. ft. = 1014508.8 cu. in.

1014508.8 cu. in.  $\div$  2150.4 cu. in. = 471.77 times = 471.77 bu.

20.

12 cu. ft.  $\times$  8  $\times$   $6\frac{1}{2}$  = 608 cu. ft. = 1,050,624 cu. in.1,050,624 cu. in.  $\div$  231 cu. in. = 4548.15 times = 4548.15  
gal. = 72.2 hhd.

21.

A wall 5 ft. thick at bottom and 2 ft. thick at top averages  
 $\frac{5 \text{ ft.} + 2 \text{ ft.}}{2} = 3\frac{1}{2}$  ft. thick, and the area of a vertical sectionis  $3\frac{1}{2} \times 5$  sq. ft. =  $17\frac{1}{2}$  sq. ft.Since the wall diminishes 5 ft. - 2 ft. = 3 ft. in thickness  
in the whole height, in 2 ft. of height from the bottom it  
must diminish  $\frac{2}{3}$  of 3 ft. =  $1\frac{1}{3}$  ft.; and 5 ft., the thickness at  
bottom -  $1\frac{1}{3}$  ft., the diminution in thickness in 2 ft. in height,  
=  $3\frac{2}{3}$  ft., thickness of wall at the height of 2 ft. from bottom.The average thickness of this wall is  $\frac{5 \text{ ft.} + 3\frac{2}{3} \text{ ft.}}{2} = 4\frac{2}{3}$  ft.,and the area of a vertical section is  $4\frac{2}{3} \times 2$  sq. ft. =  $8\frac{4}{3}$  sq. ft.  
Then  $17\frac{1}{2}$  sq. ft., area of vertical section of wall laid in two days,  
less  $8\frac{4}{3}$  " " " " " " " " first day,  
leaves  $8\frac{1}{6}$  " " " " " " " " second day.

Therefore, he laid the most wall the first day.

22.

$5^3 : 8^3 :: 12 \text{ pailfuls} : - \text{pailfuls.}$

$$\frac{12 \text{ pailfuls} \times 512}{125} = 49.152 \text{ pailfuls.}$$

23.

$1 \text{ pt.} : 1 \text{ gal. or } 8 \text{ pt.} \left\{ : : 15 \text{ times} : - \text{times.} \right.$   
 $1.5^3 : 1^3$

$$\frac{15 \times 8}{1.5^3} = 35\frac{1}{3} = 35\frac{1}{3} \text{ times.}$$

## CHAPTER XII.

### MISCELLANEOUS PROBLEMS.

1.  $436\frac{47}{11} \times 735 = 321,007.$

2.

1 A. = 43,560 sq. ft.; and 1,000 fathoms = 6,000 ft.

$(6000 \times 43,560 =) 261,360,000$  cu. ft.

$(62 \text{ lb. } 8 \text{ oz.} =) 62.5 \text{ lb.} \times 261,360,000 = 16,335,000,000 \text{ lb.}$

3.  $5,313 = 3 \times 7 \times .11 \times .23.$

4.

$(8 + 9 =) 17$  persons.

$\$2.40 \times 17 = \$40.80$ , whole sum paid.

$\$40.80 \div 8 = \$5.10$ , paid by each gentleman.

5.  $\frac{1111}{1000} = \frac{11}{10}.$

6.  $.735 \text{ mi.} = 3880.8 \text{ ft.}$

7.

$1 + 25\% = 1.25$ ; and

$\$4.60 \times 1.25 = \$5.75.$

8.

$33\frac{1}{2} \text{ lb.} : 12\frac{1}{2} \text{ lb.} :: \$29\frac{1}{2} : \$ -$

$$\frac{12\frac{1}{2} \times \$29\frac{1}{2}}{33\frac{1}{2}} = \$10.94.$$

9.

$\frac{11}{12} \times 14 \text{ ft.} = 12\frac{1}{3} \text{ ft., in } 1 \text{ board.}$

$12 \times 12\frac{1}{3} \text{ ft.} = 140 \text{ ft., in } 12 \text{ boards.}$

10.

7 doz. brooms, @  $\$2.25 = \$15.75$

(7 doz. =) 84 " "  $.31\frac{1}{4} = 26.25$

Gain,  $\$10.50$

11.

1 sack of 49 lb. =  $\frac{49}{198}$  bar., or  $\frac{1}{4}$  bar.2,230 bar.  $\div \frac{1}{4}$  bar. = 8,920 times = 8,920 sacks.

8,920 sacks, @ \$3.15, sold for \$28,098.00

2,230 bar., " 9.25, cost 20,627.50

Gain, \$ 7,470.50

12.

 $(2 \times 4 \text{ rd.}) + (2 \times 10 \text{ rd.}) = 28 \text{ rd.} = 462 \text{ ft., length of fence.}$ 

Picket, 3 in., + space, 3 in., = 6 in., or 2 pickets to 1 ft.

462 times 2 pickets = 924 pickets.

13.

The shortest distance must be the least common multiple of  
1 ft., 2 ft., 3 ft., and 10 ft.

The prime factors of 1, 2, 3, and 10, are 2, 3, and 5, and

 $2 \times 3 \times 5 = 30$ . Hence, 30 ft.

14.

 $\$26.52 \div \$3.25 = 8.16$  times.

Hence, 8.16 C., or 816 broom handles.

15.

 $1 - 4\% = .96 = \frac{24}{25}$ , part of flock remaining. $\frac{24}{25} - \frac{1}{4} = \frac{68}{100}$ , part sold to the butcher. $\frac{68}{100}$  of the flock are 68 sheep;  $\frac{1}{100}$  is 1 sheep; and  $\frac{175}{100}$  are 175 sheep.

16.

 $9\frac{3}{4} \text{ A.} : 17.2 \text{ A.} :: 21\frac{3}{4} \text{ bu.} : - \text{ bu.}$  $\frac{17.2 \times 21.75 \text{ bu.}}{9\frac{3}{4}} = 38.7 \text{ bu.}$ 

17.

18 ft. 4 in. =  $18\frac{1}{3}$  ft. $18\frac{1}{3} \times 30 \text{ sq. ft.} = 550 \text{ sq. ft.} = 79,200 \text{ sq. in. on one side of the roof.}$  $2 \times 79,200 \text{ sq. in.} = 158,400, \text{ sq. in. on both sides.}$  $14 \times 22 \text{ sq. in.} = 308 \text{ sq. in., surface of 1 sheet.}$  $158,400 \text{ sq. in.} \div 308 \text{ sq. in.} = 514\frac{2}{3} \text{ times} = 514\frac{2}{3} \text{ sheets.}$

18.

	1,500 = 15 C.	
Cost of	first C,	\$ 2.75
" " (15 - 1) = 14 "	@ \$1.25,	<u>17.50</u>
" "	15 "	\$20.25

19.

Estate,	\$53,166
Liabilities,	<u>17,496</u>
Left for family,	\$35,670
$\frac{1}{3}$ of \$35,670 =	\$11,890, widow's share.
<u>\$35,670 - \$11,890</u>	= \$4,756, each child's share.
5	

20.

3 bu. = 96 qt.

96  $\times$  67.2 cu. in. = 6451.2 cu. in.6451.2 cu. in.  $\div$  57.75 cu. in. = 111.7 + times = 111.7 qt.,  
liquid measure.

(111.7 qt. =) 223.4 pt. @ \$ .10, sell for \$22.34

3 bu. " 4.25, cost 12.75

Profits, \$ 9.59

21. .00096 =  $\frac{96}{1000000}$  =  $\frac{3}{3125}$ .

22.

2,380 bu. wheat, @ \$1.40 = \$3,332

Freight on 2,380 bu., " .50 = 1,190

Whole cost, \$4,522

20%, or  $\frac{1}{5}$  of \$4,522 = \$904.40, loss.

23.

9 qt. per day for 365 days = 3,285 qt. yearly from 1 cow.

3,285 qt. @ \$.07 = \$229.95, receipts " " 1 "

Receipts from 25 cows, at \$229.95 each, = \$5,748.75

Cost of care and keeping 25 " " 78.00 " = 1,950.00

Annual profits, \$3,798.75

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24.

Cost of \$1, at  $3\frac{1}{2}\%$  premium, \$1.0375.

$\$664 \div \$1.0375 = 640$  times = \$640, face of draft.

25.

$11\% - 7\frac{1}{2}\% = 3\frac{1}{2}\% = .03\frac{1}{2}$ , gain on each dollar of one half my capital.

$\$175 \div .035 = \$5,000$ , one half my capital.

$2 \times \$5,000 = \$10,000$ , my capital.

26.

$1,600 \times 35$  lb. (1 bu. in Iowa) = 56,000 lb., weight of oats.

$56,000$  lb.  $\div 32$  lb. (1 bu. in N. Y.) = 1,750 times = 1,750 bu. in N. Y.

1,750 bu., @ \$.54, sold for \$945

1,600 " " .56, cost 896

Gain, \$49

27.

( $\frac{3}{4}$  of a bar. =) 75 lb., @ \$.12 $\frac{1}{2}$ , \$ 9.37 $\frac{1}{2}$

(200 lb. - 75 lb. =) 125 lb., " .14, 17.50

Receipts, \$26.87 $\frac{1}{2}$

Cost, 22.75

Profits, \$4.12 $\frac{1}{2}$

28.

Latitude of Portland, 43° 39' N.

" " L. Titicaca, 16 42 S.

Diff in lat., 60° 21', or 60.35°

$60.35 \times 69.16$  mi. = 4173.8 mi.

29.

Principal, \$750

Interest for 8 mo., @ 6%, 30

Face of note, \$780

Bank discount for 5 mo. 3 da., at 6%, 19.89

Proceeds, \$760.11



Q. 330

30.

$$\left. \begin{array}{l} 5 \text{ men} : 3 \text{ men} \\ 240 \text{ ft.} : 180 \text{ ft.} \\ 6 \text{ ft.} : 4 \text{ ft.} \end{array} \right\} :: 15 \text{ da.} : - \text{ da.} \quad \frac{8 \times 180 \times 4 \times 15 \text{ da.}}{5 \times 240 \times 6} = 4\frac{1}{2} \text{ da.}$$

31.

\$40 is the first term.

\$.26 $\frac{2}{3}$ , the interest for 1 mo. at 8%, is the common difference.

12 is the number of terms.

$\$40 + (11 \times \$.26\frac{2}{3}) = \$42.93\frac{1}{3}$ , last term.

$$\frac{(\$40 + \$42.93\frac{1}{3}) \times 12}{2} = \$497.60, \text{ whole amount.}$$

$$32. \$3,156 \div \$493,125 = .0064 = .64 \text{ of } 1\%, \text{ the rate.}$$

33.

$$\$ 750 \times .0064 = \$ 4.80, \text{ A's tax.}$$

$$3,850 \times .0064 = 24.64, \text{ B's "}$$

$$1,600 \times .0064 = 10.24, \text{ C's "}$$

$$14,500 \times .0064 = 92.80, \text{ D's "}$$

34.

First payment less than interest due.

1868 yr. 10 mo. 25 da.	Principal,	\$1,650
1866    11    19	Int. to Oct. 25, 1868,	191.40
1 yr. 11 mo. 6 da.	Amount,	\$1,841.40
	Sum of payments,	600
1869 yr. 3 mo. 4 da.	New principal Oct. 25, 1868,	\$1,241.40
1868    10    25	Interest to settlement,	26.69
4 mo. 9 da.	Amount due at settlement,	\$1,268.09

$$35. 44 \times 75 \text{ sq. ft.} = 3,300 \text{ sq. ft.} = 33 \text{ squares.}$$

36.

*Left Wing.*

11,498 men.

16,488

27,986 men.

9,894

18,092 men.

*Center.*

23,518 men.

3,486

27,004 men.

5,145

32,149 men.

*Right Wing.*

18,675 men.

9,894

28,569 men.

5,145

23,424 men.

37.

$(4 \times 5 \times 244 \text{ cu. ft.}) = 4,880 \text{ cu. ft.} = 38\frac{1}{2} \text{ cd.};$  and  
 $\$152.50 \div 38\frac{1}{2} = \$4,$  price per cord.

38.

3 oz. 3 pwt.  $19\frac{1}{4} \text{ gr.} = 1531.25 \text{ gr.}$

175 lb. Troy : 144 lb. avoirdupois ::  $1531.25 \text{ gr.} : \text{— gr.}$

$\frac{144 \times 1531.25 \text{ gr.}}{175} = 1,260 \text{ gr.}$

$1,260 \text{ gr.} \div 437.5 \text{ (see Arith., p. 143,)} = 2.88 \text{ oz.}$

39.

The goods were sold at  $(100\% - 5\%) = .95\% = .95$  of the marked price, and that was  $(100\% + 25\%) = 125\% = 1.25$  of cost.

The cost is  $.95 \div 1.25 = .76$  of the marked price.

1, the marked price,  $-.76$ , the cost,  $=.24$  above cost; and

$.24 \div .76 = .31\frac{1}{3}$  times  $= 31\frac{1}{3}\%$  advance.

40.

225 bu., @ \$1.45, cost \$326.25

Shipstuffs " 54.75

Cost of wheat, less sum received for shipstuffs, \$271.50

Desired profit, 104.50

Total receipts for flour, \$376.00

$225 \text{ bu.} \div 4.5 \text{ bu.} = 50 \text{ times} = 50 \text{ bar.}$

$\$376 \div 50 = \$7.52,$  selling price per bar. for the flour.

41.

100 A. = 16,000 sq. rd.

$\frac{64.7 \text{ rd.} + 135.3 \text{ rd.}}{2} = 100 \text{ rd.,}$  average width of farm.

$16,000 \text{ sq. rd.} \div 100 \text{ sq. rd.} = 160 \text{ times} = 160 \text{ rd.,}$  distance  
 between the two parallel sides.

## 42.

A box of glass contains 50 sq. ft. = 7,200 sq. in.

A pane of  $8 \times 10$  glass contains 80 " "

" "  $9 \times 16$  " " 144 " "

" "  $10 \times 18$  " " 180 " "

$7,200 \text{ sq. in.} \div 80 \text{ sq. in.} = 90 \text{ times} = 90 \text{ panes of } 8 \times 10 \text{ glass.}$

$7,200 \text{ " " } \div 144 \text{ " " } = 50 \text{ " } = 50 \text{ " " } 9 \times 16 \text{ " "}$

$7,200 \text{ " " } \div 180 \text{ " " } = 40 \text{ " } = 40 \text{ " " } 10 \times 18 \text{ " "}$

## 43.

Face of note, for 63 days, to obtain \$1, \$1.0105; and

$$250 \times \$1.0105 = \$252.62\frac{1}{2}.$$

## 44.

Since his savings and his expenses equal his salary, and 6% of his expenses equals 20% of his savings, he saves \$6 and expends \$20 of every \$26 of his salary. Then

$$26\% : 6\% :: \$1,050 : \$ -$$

$$\frac{6 \times \$1,050}{26} = \$242.31, \text{ his savings.}$$

## 45.

$$51.2 \text{ T.} : 32.75 \text{ T.} :: \$268.80 : \$ -$$

$$\frac{\$268.80 \times 32.75}{51.2} = \$171.94.$$

## 46.

$$\$1,500 - \$1,075 = \$425, \text{ loss on building.}$$

$$\$1,075 \times .01\frac{1}{4} = 13.43\frac{3}{4}, \text{ premium.}$$

$$\$438.43\frac{3}{4}, \text{ total loss.}$$

## 47.

$(22.4 \text{ A.} =) 3,584 \text{ sq. rd.} \div 3\frac{1}{2} = 1,024 \text{ sq. rd. in the field.}$

$\sqrt{1,024} = 32 = 32 \text{ rd., the width of}$  " "

$32 \text{ rd.} \times 3\frac{1}{2} = 112 \text{ rd., " length "}$  " "

Hence, 32 by 112 rods.

48.

$(7 \times 4 \times 1 =) 28$  cu. ft., contents of a block of same proportionate dimensions and 1 ft. thick. Then, since similar solids are to each other as the cubes of their proportionate dimensions, we have

$$28 \text{ cu. ft.} : 54\frac{1}{8} \text{ cu. ft.} :: 7^3 : \text{cube of length.}$$

$$28 \text{ cu. ft.} : 54\frac{1}{8} \text{ cu. ft.} :: 4^3 : \text{cube of width.}$$

$$28 \text{ cu. ft.} : 54\frac{1}{8} \text{ cu. ft.} :: 1^3 : \text{cube of thickness.}$$

$$\frac{\sqrt[3]{\frac{875}{16} \times 343}}{28} = \sqrt[3]{669.921875} = 8.75.$$

$$\frac{\sqrt[3]{\frac{875}{16} \times 64}}{28} = \sqrt[3]{125} = 5.$$

$$\sqrt[3]{\frac{875}{16}} \div 28 = \sqrt[3]{1.953125} = 1.25.$$

Hence, the block is 8.75 ft. long, 5 ft. wide, and  $1\frac{1}{4}$  ft. thick.

49.

$$\frac{3}{4} \text{ mi.} = 240 \text{ rd.}$$

$$7\frac{7}{8} \text{ rd.} = 7 \quad 4 \text{ yd. } 2 \text{ ft. } 5\frac{1}{2} \text{ in.}$$

$$\frac{3}{8} \text{ yd.} = \quad \quad \quad 2$$

Required distance, 247 rd. 5 yd. 1 ft.  $5\frac{1}{4}$  in.

50.

The note was due Jan. 10. of the next year.

Principal, \$356.00

Interest for 10 mo., at 7%, 20.77

Face of note, \$376.77

Time from Aug. 25 to Jan. 13, 4 mo. 20 da.

Bank discount for  $4\frac{2}{3}$  mo., at 7%, 10.26

Proceeds, \$366.51

## 51.

## Disbursements.

135 head @ \$23, \$3,105

147 " " 19, 2,793

Transportation, 1,597 \$7,495

## Receipts.

163 head @ \$37, \$6,031

(135 + 147 - 163 =) 119 " " 31, 3,689 9,720

Gain, \$2,225

## 52.

(706.<sup>337</sup>/<sub>1000</sub> mi. =) 706.0674 mi. ÷ 69.16 mi. = 10.209187 +  
times = 10° 12' 33".

Latitude of Chicago, 41° 54' N.

Difference in latitude, 10 12 33"

Latitude of Mobile, 31° 41' 27" N.

## 53.

 $\frac{2}{3}$  = cost of horse. $\frac{2}{3} + \frac{1}{3} = 1^0$ , of the cost = price received.\$216 =  $1^0$  of the cost of the horse.\$216 ÷  $1^0$  = \$194.40 " " " "

## 54.

456 lb. : 260 lb. :: 15<sup>3</sup>: — $\frac{2275 \times 260}{456} = 1294.342$ ; and  $\sqrt[3]{1294.342} = 12.4$  times = 12.4 in.

## 55.

 $\frac{2}{3}$  of \$852.75 = \$243.64, cost of a half-acre.

2 × \$243.64 = \$487.28, " " an acre.

## 56.

The note was due Aug. 20 — 23; and was discounted for 56 days.

Face of note, \$237.40

Bank discount from June 28 to Aug. 23, at 7%, 2.58

Proceeds, \$234.82

57.

$\sqrt{16^2 + 12^2} = 20 = 20 \text{ ft.}$ , the diagonal of one end of the room.

$\sqrt{20^2 + 20^2} = 28.28 = 28.28 \text{ ft.}$ , the required distance.

58.

Difference in time, 47 min. 12 sec.

15

“ “ longitude,  $11^\circ 48'$

Longitude of Cincinnati,  $84^\circ 24' \text{ W.}$

Difference in longitude,  $11^\circ 48'$

Longitude of Montpelier,  $72^\circ 36' \text{ W.}$

59.

2 bu. @  $\$1.81\frac{1}{2} = \$2.62\frac{1}{2}$ .

$\$.10 + \$.11 = \$.21$ , cost of 1 lb. of each kind.

$\$2.62\frac{1}{2} \div \$.21 = 12.5 \text{ times.}$

Hence, 12.5 lb. of each kind, or 25 lb. of both kinds.

60.

1 yr. 5 mo. 24 da. = 17.8 mo.

$\frac{\$400 \times \text{rate \% in this State} \times 17.8}{12} = \text{interest required.}$

61.

A's share of profit 1st yr.,  $\$340.65$

“ gain in selling,  $(\$876.74 - \$750 =) 126.74$

A's whole gain,  $\$467.89$

B's capital is  $(\$1,250 - \$750 =) \$500 = \frac{500}{1250}$ , or  $\frac{2}{5}$  of the joint capital.

A's capital is  $\frac{750}{1250}$ , or  $\frac{3}{5}$  of the joint capital.

Since  $\frac{3}{5}$  of the capital gains  $\$340.65$ ,  $\frac{1}{5}$  will gain  $\frac{1}{3}$ , and  $\frac{2}{5}$  will gain  $\frac{2}{3}$  of  $\$340.65$ .

$\frac{2}{5}$  of  $\$340.65 = \$227.10$ , B's share of first year's profit.

$\$637.50 - \$500 = 137.50$ , “ gain in selling.

$\$864.60$ , “ whole gain.

*Carried forward.*

*Brought forward.*

C's 1st investment,	\$637.50	
" 2d "	876.74	
" whole "	\$1,514.24	
" share of profits,	247.80	
C had invested	\$1,266.44	more than he had realized.

62.

$$\begin{aligned}
 3.6 + 2.24 &= 5.84, & \text{their sum.} \\
 3.6 - 2.24 &= 1.36, & \text{" difference.} \\
 5.84 \times 1.36 &= 7.9424, & \text{product of sum and diff.} \\
 3.6^2 - 2.24^2 &= 7.9424, & \text{diff. of their squares.}
 \end{aligned}$$

63.

A, B, C, and D can build  $\frac{1}{12}$ ,  $\frac{1}{18}$ ,  $\frac{1}{8}$ , and  $\frac{1}{9}$  respectively, in 1 day. They can, together, build  $\frac{1}{12} + \frac{1}{18} + \frac{1}{8} + \frac{1}{9} = \frac{14}{144}$  in 1 day. Since they build  $\frac{14}{144}$  in 1 day, to build 1, or  $\frac{144}{14}$ , they must work  $1 \div \frac{14}{144} = \frac{144}{14} = 3\frac{12}{7}$  times =  $3\frac{12}{7}$  days.

64.

$\frac{1}{2}$ , the product,  $\div \frac{2}{3}$  of  $\frac{2}{3}$  of 2, one factor, =  $1\frac{1}{3}$ , the other factor.

65.

At 4 cts. for 3 peaches, they cost  $\frac{4}{3}$  cts. each.  
 " 5 " " 2, he received  $\frac{5}{2}$  " "  
 $\frac{5}{2}$  cts. -  $\frac{4}{3}$  cts. =  $\frac{7}{6}$  cts., gain on one peach.  
 $\$4.20 \div \frac{7}{6}$  cts. = 360 times = 360 peaches.

66.

The No. of cu. ft. of space in the room  
 As many times 80 cu. ft. as there are persons = time required.

67.

\$100 due in 6 mo. = \$ 600 due in 1 mo.  
 120 " " 7 " = 840 " " 1 "  
 160 " " 10 " = 1,600 " " 1 "  
 \$380 " " ? " = \$3,040 " " 1 "  
 $\$3,040 \div \$380 = 8$  times = 8 mo.

68.

Longitude of Pekin,  $118^{\circ}$  E.

" " San Francisco,  $112^{\circ}$  W.

Pekin is  $240^{\circ}$  E. of San Francisco.

$240^{\circ} \div 15^{\circ} = 16$  times = 16 hours.

16 hours before noon is 8 P. M. of the previous day, the time at San Francisco.

69.

$84 \text{ ft.} \div 14 \text{ ft.} = 6 \text{ times} = 6 \text{ boards in length.}$   
 $56 \text{ ft.} \div \frac{1}{2} \text{ ft.} = 112 \text{ times} = 112 \text{ boards in width.}$   
 $112 \times 6 \text{ boards} = 672 \text{ boards in the floor.}$   
 $672 \times 8 \text{ nails} = 5,376 \text{ nails.}$   
 $5,376 \text{ nails} \div 68 \text{ nails} = 79\frac{1}{7} \text{ times} = 79\frac{1}{7} \text{ lb.}$

70.

$(2 \times 4 \times 8 =) 64 \text{ cu. in. in 1 brick.}$   
 $22\frac{1}{2} \times 64 \text{ cu. in.} = 1,440 \text{ cu. in. of brick in 1 cu. ft.}$   
 $(1 \text{ cu. ft.} =) 1,728 \text{ cu. in.} - 1,440 \text{ cu. in.} = 288 \text{ cu. in.}$   
 $288 \text{ cu. in.} \div 1,728 \text{ cu. in.} = \frac{1}{6}.$

Hence,  $\frac{1}{6}$  of the wall consists of mortar.

71.

$2 \times 48 \text{ ft.} + 2 \times (25 \text{ ft.} - 2 \text{ ft.}) = 142 \text{ ft., length of walls.}$   
 $18 \times 142 \text{ cu. ft.} = 2,556 \text{ cu. ft. of wall.}$   
 $2\frac{1}{2}\%$  of 2,556 cu. ft. = 63.9 cu. ft. of openings.  
 $2,556 \text{ cu. ft.} - 63.9 \text{ cu. ft.} = 2492.1 \text{ cu. ft. of brick work.}$   
 $2492.1 \times 22.5 \text{ bricks} = 56072.25 \text{ bricks.}$

72.

$2\frac{1}{2} \text{ yd. @ } \$1\frac{3}{4} = \$4\frac{3}{4} = \text{cost of } .7 \text{ T. of coal.}$   
 $\$4\frac{3}{4}, \text{ cost,} \div .7, \text{ quantity,} = \$6.25, \text{ price of 1 ton.}$

73.

$8 \text{ eggs} = \frac{2}{3} \text{ doz., and}$   
 $\$.25, \text{ cost,} \div \frac{2}{3}, \text{ quantity,} = \$.37\frac{1}{2}, \text{ price of 1 doz.}$



## 74.

Reducing the given fractions to the least similar fractions, we have  $\frac{3}{2}, \frac{4}{3}, \frac{5}{4}, \frac{7}{5} = \frac{315}{210}, \frac{280}{210}, \frac{210}{210}, \frac{315}{210}$ .

Finding the least common multiple of the numerators of these fractions, we have

$$210 = 2 \times 3 \times 5 \times 7$$

$$252 = 2 \times 2 \times 3 \times 3 \times 7$$

$$225 = 3 \times 3 \times 5 \times 5$$

$$245 = 5 \times 7 \times 7$$

$$2 \times 2 \times 3 \times 3 \times 7 \times 5 \times 5 \times 7 = 44,100$$

Since the numerators of all the given fractions are exact divisors of this common multiple, and the common denominator, 315, is an exact divisor of itself, we have, for the least common multiple,  $\frac{44100}{315} = 140$ .

## 75.

$$222 = 2 \times 3 \times 37$$

$$104 = 2 \times 2 \times 2 \times 13$$

$$68 = 2 \times 2 \times 17$$

$$54 = 2 \times 3 \times 3 \times 3$$

$$34 = 2 \times 17$$

$2 \times 2 \times 2 \times 13 \times 3 \times 37 \times 17 \times 3 \times 3 = 1,766,232$ , the least common multiple.

\* Since 2 is the only common factor, it must be the greatest common divisor.

## 76.

60 da. + 4 da. for transmission + 3 da. grace = 67 da., time.

Bank discount on \$1,275 for 67 da., at 7%, \$16.61.

Exchange on \$1,275, at  $1\frac{1}{4}\%$  discount, \$15.94.

\$1,275 - (\$16.61 + \$15.94) = \$1,242.45, proceeds of draft.

$\frac{1}{2}\%$  on \$1,242.45 = \$6.21, cost of collecting.

\$1,242.45 - \$6.21 = \$1,236.24, net proceeds.

## 77.

$2 \times 18$  ft. +  $2 \times .16$  ft. = 68 ft., length of walls.

$9 \times 68$  sq. ft. = 612 sq. ft., surface " "

$16 \times 18$  sq. ft. = 288 " " " ceiling.

900 sq. ft., whole surface.

*Carried forward.*

*Brought forward.*

$$2 \times 3 \times 6 \text{ sq. ft.} = 36 \text{ sq. ft. for windows.}$$

$3 \times 3 \times 7 = 63$  doors.

99 sq. ft. for openings.

900 sq. ft. — 49.5 sq. ft. ( $\frac{1}{2}$  of 99 sq. ft. for openings) = 850.5 sq. ft. = 94.5 sq. yd. of plastering.

612 sq. ft., walls, — 99 sq. ft., openings, = 513 sq. ft. = 57 sq. yd. to be papered.

1 ft. 6 in. =  $\frac{1}{2}$  yd., and  $\frac{1}{2} \times 7$  sq. yd. =  $3\frac{1}{2}$  sq. yd., surface covered by one roll of paper.

$$57 \text{ sq. yd.} \div 3\frac{1}{2} \text{ sq. yd.} = 16\frac{2}{3} \text{ times} = 16\frac{2}{3} \text{ rolls of paper.}$$

94.5 sq. yd. of plastering @ \$.36 = \$34.02

16 1/2 rolls of paper and hanging " .75 = 12.21

**Total cost, \$46.23**

78.

$$2 \times 120 \text{ sq. rd.} = 240 \text{ sq. rd. of road on one side of farm.}$$

$2 \times (90.5 \text{ sq. rd.} - 2 \text{ sq. rd.}) = 88.5 \text{ sq. rd.} = 177 \text{ sq. rd. of road on one end of farm.}$

240 sq. rd. + 177 sq. rd. = 417 sq. rd. = 2 A. 97 sq. rd. of farm in road.

Or,

$90.5 \times 120 \text{ sq. rd.} = 10,860 \text{ sq. rd. in the whole farm.}$

$$(90.5 - 2) \times (120 \text{ sq. rd.} - 2 \text{ sq. rd.}) = 10,443 \text{ sq. rd. not in the road.}$$

$$10,860 \text{ sq. rd.} - 10,443 \text{ sq. rd.} = 417 \text{ sq. rd. in the road.}$$

Hence, there are  $\frac{417}{10880} = \frac{139}{3840}$  of the farm in the road.

**79.**

$$1,950 \text{ mi.} \div 1.15 \text{ mi.} = 1695.6 + \text{times} = 1695.6 + \text{knots.}$$

$$1695.6 \text{ knots} \div 9.5 \text{ knots} = 178.5 \text{ times, nearly,} = 178.5 \text{ h.} = 7 \text{ da. } 10\frac{1}{2} \text{ h.}$$

**80.**  $144 \text{ sq. in.} \div 9 \text{ sq. in.} = 16 \text{ times.}$  Hence, 16 in. in length.

**81.**

Average width,  $\frac{16}{2}$  in. = 8 in. =  $\frac{2}{3}$  ft.

$$13 \times \frac{2}{3} \times 14 \text{ sq. ft.} = 121\frac{1}{3} \text{ sq. ft.} = 121\frac{1}{3} \text{ M.}$$

$$.1214 \text{ M. @ } \$18.50 = \$1.64.$$

82.

$$\begin{array}{rcl}
 5,000 \text{ bar. @ } \$1.60 & = & \$8,000, \text{ first cost.} \\
 2\frac{1}{2}\% \text{ on } \$8,000 & = & 200, \text{ commission.} \\
 & & \$8,200, \text{ face of draft.} \\
 \frac{1}{4}\% \text{ on } \$8,200 & = & \$20.50, \text{ discount on " } \\
 \$8,200 - \$20.50 & = & \$8,179.50, \text{ cost of " } \\
 5,000 \text{ bar. @ } \$1.30 & = & 1,500.00, \text{ " " transportation.} \\
 & & \$9,679.50, \text{ total investment.} \\
 5,000 \text{ bar. @ } \$2.10 & = & 10,500.00, \text{ " receipts.} \\
 & & \$820.50, \text{ profits.}
 \end{array}$$

83.

$$\begin{array}{l}
 \sqrt{95^2 - 76^2} = 57 = 57 \text{ ft., height of building, B, above post.} \\
 64 \text{ ft.} - 57 \text{ ft.} = 7 \text{ ft., " " post.}
 \end{array}$$

84.

$$\begin{array}{l}
 55 \text{ ft.} - 7 \text{ ft.} = 48 \text{ ft., height of building, A, above post.} \\
 \sqrt{80^2 - 48^2} = 64 = 64 \text{ ft., distance from foot of post to foot of} \\
 \text{building, A.} \\
 64 \text{ ft.} + 76 \text{ ft.} = 140 \text{ ft., horizontal distance between buildings.}
 \end{array}$$

85.

$$\begin{array}{l}
 64 \text{ ft.} - 55 \text{ ft.} = 9 \text{ ft., height of building, B, above top of build-} \\
 \text{ing A.} \\
 \sqrt{140^2 + 9^2} = 140.29 = 140.29 \text{ ft., between tops of buildings.}
 \end{array}$$

$$86. \quad 9,111^3 \times 3.1416 = 260785224.4536.$$

87.

$$\begin{array}{l}
 9,111^3 \times .7854 = 594003544999.1874, \text{ contents of cylinder of} \\
 \text{same diameter as the earth.} \\
 \frac{2}{3} \text{ of } 594003544999.1874 \text{ cu. mi.} = 3960023332.7916 \text{ cu. mi. in} \\
 \text{the earth.}
 \end{array}$$

88.

$$\begin{array}{l}
 \left. \begin{array}{l}
 35 \text{ ft. long} : 48 \text{ ft. long} \\
 18 \text{ ft. high} : 21 \text{ ft. high} \\
 4 \text{ ft. wide} : 5 \text{ ft. wide} \\
 12 \text{ days} : 15 \text{ days} \\
 10 \text{ hours} : 8 \text{ hours}
 \end{array} \right\} :: 6 \text{ masons} : - \text{ masons.} \\
 \frac{48 \times 21 \times 5 \times 15 \times 8 \times 6 \text{ masons}}{35 \times 18 \times 4 \times 12 \times 10} = 12 \text{ masons.}
 \end{array}$$

89.

21 yr. — 10 yr. = 11 yr.	
21 yr. — 12 yr. = 9 yr.	
21 yr. — 15 yr. = 6 yr.	
Present worth of \$1 for 11 yr., at 7%, ( $\$1 \div 1.77 =$ )	\$ .565
" " " \$1 " 9 " " " ( $\$1 \div 1.63 =$ )	.6135
" " " \$1 " 6 " " " ( $\$1 \div 1.42 =$ )	.7042
	<u>\$1.8827</u>
$\$7,500 \times \frac{1.111}{1.8827} =$	\$2,250.756, share of youngest.
$\$7,500 \times \frac{1.122}{1.8827} =$	\$2,443.963, " " 2d.
$\$7,500 \times \frac{1.142}{1.8827} =$	\$2,805.279, " " oldest.

90.

1860 yr. 5 mo. 7 da.	Prin.,	\$13,275
1865 10 10	Int. to May 7, 1866,	457.98
6 mo. 27 da.	Amt. due, " " "	\$13,732.98
	Payment,	1,250.00
1866 yr. 12 mo. 11 da.	New Prin.,	\$12,482.98
1866 5 7	Int. to Dec. 11, 1866,	445.22
7 mo. 4 da.	Amt. due, " " "	\$12,928.20
	Payment,	760.00
1867 yr. 6 mo. 23 da.	New Prin.,	\$12,168.20
1866 12 11	Int. to June 23, 1867,	389.38
6 mo. 12 da.	Amt. due, " " "	\$12,557.58
	Payment,	500.00
1867 yr. 11 mo. 8 da.	New Prin.,	\$12,057.58
1867 6 23	Int. to Nov. 8, 1867,	271.20
4 mo. 15 da.	Amt. due, " " "	\$12,328.87
	Payment,	850.00
1869 yr. 1 mo. 1 da.	New Prin.,	\$11,478.87
1867 11 8	Int. to Jan. 1, 1869,	790.12
1 yr. 1 mo. 23 da.	Amt. due, " " "	\$12,268.99
	Payment made July 20, 1868, }	
	less than interest due, }	850.00
	Sum paid at settlement,	\$11,918.99

## 91.

$1.06^4 \times \$2,000 = \$2,382.032$ , last term, or amount of 1st year's rent.

$$\frac{(\$2,382.032 \times 1.06) - \$2,000}{1.06 - 1} = \begin{cases} \$8,749.232, \text{ sum of the series, or} \\ \text{Amt. of rent at end of 4 years.} \end{cases}$$

Amount of \$1, in 4 yr., at 6% compound interest, \$1.26247696.  
 $\$8,749.232 \div \$1.26247696 = 6930.21$  times = \$6930.21, present worth.

## 92.

$\$3,000 - \$1,775 = \$1,225$ , whole sum received for labor.

$(108 + 72 + 45 =) 225$  da., " number of days' work.

$\$1,225 \times \frac{108}{225} = \$588$ , carpenter's share.

$\$1,225 \times \frac{72}{225} = \$392$ , mason's "

$\$1,225 \times \frac{45}{225} = \$245$ , painter's "

## 93.

$100\% - 80\% = 20\%$ , saved last year.

$\$480 \div .20 = \$2,400$ , last year's income.

$\$2,400 \div .75 = \$3,200$ , this " "

$\$2,400 \div \$480 = \$1,920$ , last " expenses.

$\$1,920 \div .96 = \$2,000$ , this " "

$\$3,200 - \$2,000 = \$1,200$ , saved this year.

## 94.

115 shares at \$79.50, cost \$9,142.50.

63 " " \$85, exchanged for \$5,355.

$\$5,355 \div \$1.11 = 4824.32$  times = \$4,824.32, U. S. 5-20's.

$\$4,824.32 \times 1.16\frac{1}{2} = \$5,602.24$ , receipts for 63 shares of Express Stock.

$(115 - 63 =) 52$  shares at \$100 = \$5,200.

$\$5,200 \div \$78 = 66\frac{2}{3}$  times =  $66\frac{2}{3}$  shares R.R. Stock.

$66\frac{2}{3}$  shares R.R. Stock at \$72 = \$4,800, receipts for 52 shares of Express Stock.

$(\$5,602.24 + \$4,800 =) \$10,402.24 - \$9,142.50 = \$1,259.74$ , gain.

95.

1st.—*Averaging the Debits.*

Jan. 13 + 4 mo. = May 13.

Feb. 12 + 4 " = June 12.

Mar. 23 + 6 " = Sept. 23.

• April 19 + 0 " = April 19.

June 6 + 30 da. = July 6.

Focal date, April 19.

\$ 73.19, cash payment, April 19.

23.30 for 24 da. = \$ 559.20 for 1 da.

42.83 " 54 " = 2,312.82 " 1 "

48.53 " 78 " = 3,785.34 " 1 "

169.22 " 157 " = 26,567.54 " 1 "

\$357.07 " ? " = \$33,224.90 " 1 "

\$33,224.90 ÷ \$357.07 = 93 times = 93 da., average term of credit.

April 19 + 93 da. = July 21, average time for payment of debits.

2d.—*Averaging the Credits.*

Focal date, Feb. 25.

\$25, Cash payment, Feb. 25

75 for 41 da. = \$3,075 for 1 da.

20 " 86 " = 1,720 " 1 "

75 " 132 " = 9,900 " 1 "

25 " 154 " = 3,850 " 1 "

50 " 172 " = 8,600 " 1 "

\$270 " ? " = \$27,145 " 1 "

\$27,145 ÷ \$270 = 101 times = 101 da., average term of payments,

Feb. 25 + 101 da. = June 6, average time for payment of credits.

3d.—*Averaging Debits and Credits.*

Focal date, July 21.

From June 6 to July 21 = 45 da.

\$357.07 — \$270 = \$87.07.

\$270 for 45 da. = \$12,150 for 1 da.

87.07 " ? " = 12,150 " 1 "

\$12,150 ÷ \$87.07 = 140 times = 140 da., average time for bal. of %.

July 21 + 140 da. = Dec. 8, date of payment of balance.

## 96.

*1st.—Widow's Interest in Annuity.*

21 yr. — 16 yr. = 5 yr., time the widow receives the income.  
 One year's interest on \$1,500, at 6%, = \$90, common difference.  
 $\$1,500 + (4 \times \$90) = \$1,860$ , last term of an ascending arithmetical series, or the value, at the end of 5 years, of 1st year of the widow's income.

$$\frac{\$1,500 + \$1,860}{2} \times 5 = \$8,400, \text{ amount of the widow's annuity at the end of 5 years.}$$

$\$8,400 \div 1.30 = \$6,461.54$ , present worth of widow's interest.

*2d.—Daughter's Interest in Annuity.*

21 yr. — 8 yr. = 13 yr.; and 13 yr. — 5 yr. = 8 yr., time the daughter receives the income.

One year's interest on \$1,500, at 6%, = \$90, common difference.  
 $\$1,500 + (7 \times \$90) = \$2,130$ , last term of an ascending arithmetical series, or the value, at the end of 8 years, of 1st year of daughter's income.

$$\frac{\$1,500 + \$2,130}{2} \times 8 = \$14,520, \text{ amount of the daughter's annuity at the end of 8 years.}$$

$\$14,520 \div 1.78 = \$8,157.80$ , present worth of daughter's interest.

*3d.—Son's Interest in Annuity.*

21 yr. — 8 yr. = 13 yr., time to pass before the son receives the income.

$\$1,500 \div .06 = \$25,000$ , present worth of annuity to commence immediately.

$\$25,000 \div 1.78 = \$14,044.94$ , present worth of son's interest 13 years in reversion.

# APPENDIX.

## ANNUAL INTEREST.

1.

4 yr. = 24% = .24.

Interest due on principal at the end of each  
year, . . . . .

$$\$650 \times .06 = \$39.$$

Interest on principal for 4 yr.,  $\$650 \times .24 = \$156.00$

" " 1st yearly int. for 3 yr.,  $\$39 \times .18 = 7.02$

" " 2d " " 2 "  $39 \times .12 = 4.68$

" " 3d " " 1 "  $39 \times .06 = 2.34$

Total interest,  $\$170.04$

2.

3 yr. 9 mo. = 22.5% = .225.

Interest due on principal at the end of  
each year, . . . . .

$$\$1,375 \times .06 = \$82.50$$

Interest on principal for 3 yr. 9 mo.,  $\$1,375 \times .225 = \$309.38$

" " 1st yearly int. for 2 yr. 9 mo.,  $\$82.50 \times .165 = 13.61$

" " 2d " " 1 " 9 "  $82.50 \times .105 = 8.66$

" " 3d " " " 9 "  $82.50 \times .045 = 3.71$

Total interest,  $\$385.36$

3.

5 yr. 4 mo. 15 da., = 32 $\frac{1}{4}$ % = .3225.

Interest due on principal at the end of  
each year, . . . . .

$$\$287.50 \times .06 = \$17.25$$

Int. on principal for 5 yr. 4 mo. 15 da.,  $\$287.50 \times .3225 = \$92.718$

" " 1st yearly int. for 4 yr. 4 mo. 15 da.,  $\$17.25 \times .2625 = 4.528$

" " 2d " " 3 " 4 " 15 "  $17.25 \times .2025 = 3.493$

" " 2d " " 2 " 4 " 15 "  $17.25 \times .1425 = 2.458$

" " 4th " " 1 " 4 " 15 "  $17.25 \times .0825 = 1.423$

" " 5th " " " 4 " 15 "  $17.25 \times .0225 = .388$

Total interest,  $\$105.008$



4.

2 yr. 11 mo. 20 da. =  $17.8\frac{1}{2}\%$  =  $.178\frac{1}{2}$ .Int. due on prin. at the end of each year,  $\$3,125 \times .06 = \$187.50$ Int. on prin. for 2 yr. 11 mo. 20 da.,  $\$3,125 \times .178\frac{1}{2} = \$557.291$ 

Int. on 1st yearly int. for

1 yr. 11 mo. 20 da.,  $\$187.50 \times .118\frac{1}{2} = 22.187$ Int. on 2d yearly int. for 11 " 20 "  $187.50 \times .058\frac{1}{2} = 10.937$ 

Total interest, \$ 590.415

Principal, 3,125.00

Amount, \$3,715.42

5.

Interest due on prin. at the end of each year,  $\$275 \times .06 = \$16.50$ 

1st year's interest draws simple interest for 2 yr.

2d " " " " " " 1 yr.

Or, 1 " " " " " " 3 yr.

Simple interest on 1 year's int. for 3 yr.,  $\$16.50 \times .18 = \$ 2.97$ Interest on principal for 3 yr.,  $\$275 \times .18 = 49.50$ 

Total interest, \$52.47

6.

Int. due on prin. at the end of each year,  $\$241 \times .06 = \$14.46$ 

1st year's interest draws simple interest for 3 yr. 2 mo.

2d " " " " " " 2 " 2 "

3d " " " " " " 1 " 2 "

4th " " " " " " 2 "

Or, 1 " " " " " " 6 yr. 8 mo.

Simple int. on 1 yrs. int. for 6 yr. 8 mo.,  $\$14.46 \times .4 = \$ 5.78$ Interest on prin. for 4 yr. 2 mo.,  $\$241 \times .25 = 60.25$ 

Total interest, \$66.03

7.

Interest due on principal at the end

of each year, . . . .  $\$3,675.87\frac{1}{2} \times .06 = \$220.55$ *Carried forward.*

*Brought forward.*

1st year's interest draws simple interest for 2 yr. 9 mo. 24 da.

2d " " " " " " 1 " 9 " 24 "

3d " " " " " " 9 " 24 "

Or, 1 " " " " " " 5 yr. 5 mo. 12 da.

Simple interest on 1 year's interest for 5 yr. 5 mo. 12 da.,

$$\$220.55 \times .327 = \$72.12$$

Int. on prin. for 3 yr. 9 mo. 24 da.,  $\$3,675.87\frac{1}{2} \times .229 = 841.78$ Total interest,  $\$913.90$ 

## 8.

Int. due on prin. at the end of each yr.,  $\$1,000.46 \times .06 = \$60.027$ 

1st year's interest draws simple interest for 4 yr. 3 mo. 16 da.

2d " " " " " " 3 " 3 " 16 "

3d " " " " " " 2 " 3 " 16 "

4th " " " " " " 1 " 3 " 16 "

5th " " " " " " 3 " 16 "

Or, 1 " " " " " " 7 yr. 5 mo. 20 da.

Simple interest on 1 year's int. for 7 yr. 5 mo. 20, da.,

$$\$60.03 \times .448\frac{1}{2} = \$26.913$$

Int. on prin. for 5 yr. 3 mo. 16 da.,  $\$1,000.46 \times .317\frac{1}{2} = 317.812$ Total interest,  $\$344.725$ Principal,  $1,000.46$ Amount,  $\$1,345.19$ 

## 9.

$$\frac{5 \text{ yr.} - 1 \text{ yr.}}{2} = 2 \text{ yr.} = 12\% = .12.$$

Interest on principal for 5 yr.,  $\$800 \times .30 (= .06 \times 5) = \$240.00$ Simple int. on this int. for 2 yr.,  $\$240 \times .12 (= .06 \times 2) = 28.80$ Total interest,  $\$268.80$ 

## 10.

$$\frac{4 \text{ yr.} - 1 \text{ yr.}}{2} + 8 \text{ mo.} = 2 \text{ yr.} 2 \text{ mo.} = 13\% = .13.$$

Interest on principal for 4 yr.,  $\$124 \times .24 = \$29.76$ Simple int. on this int. for 2 yr. 2 mo.,  $\$29.76 \times .13 = 3.87$ Interest on principal for 8 mo.,  $\$124 \times .04 = 4.96$ Total interest,  $\$38.59$

## 11.

From Nov. 27, 1870, to July 10, 1874, 3 yr. 7 mo. 13 da.

$$\frac{3 \text{ yr.} - 1 \text{ yr.}}{2} + 7 \text{ mo. 13 da.} = 1 \text{ yr. 7 mo. 13 da.} = 9.7\frac{1}{4}\% = .097\frac{1}{4}.$$

Interest on principal for 3 yr.,  $\$96.84 \times .18 = \$17.431$

Simple interest on this interest for 1 yr. 7 mo. 13 da.,

$$\$17.43 \times .097\frac{1}{4} = 1.693$$

Interest on principal for 7 mo. 13 da.,  $\$96.84 \times .037\frac{1}{4} = 3.599$

Total interest,  $\$22.723$

## 12.

$$\frac{3 \text{ yr.} - 1 \text{ yr.}}{2} + 9 \text{ mo. 14 da.} = 1 \text{ yr. 9 mo. 14 da.} = 10.7\frac{1}{2}\% = .107\frac{1}{2}.$$

Interest on principal for 3 yr.,  $\$874.45 \times .18 = \$157.40$

Simple interest on this interest for 1 yr. 9 mo. 14 da.,

$$\$157.40 \times .107\frac{1}{2} = 16.89$$

Interest on principal for 9 mo. 14 da.,  $\$874.45 \times .047\frac{1}{2} = 41.39$

Total interest,  $\$215.68$

Principal,  $874.45$

Amount,  $\$1,090.13$

## 13.

## BY FIRST METHOD.

3 yr. 3 mo. 3 da. =  $19.55\% = .1955$ .

Int. due on principal at end of each year,  $\$272 \times .06 = \$16.32$

Int. on principal for 3 yr. 3 mo. 3 da.,  $\$272 \times .1955 = \$53.176$

" " 1st yearly int. for 2 yr. 3 mo. 3 da.,  $\$16.32 \times .1355 = 2.211$

" " 2d " " " 1 " 3 " 3 "  $\$16.32 \times .0755 = 1.232$

" " 2d " " " 3 " 3 "  $\$16.32 \times .0155 = .253$

Total interest,  $\$56.872$

## BY SECOND METHOD. .

$$\frac{3 \text{ yr.} - 1 \text{ yr.}}{2} + 3 \text{ mo. 3 da.} = 1 \text{ yr. 3 mo. 3 da.} = 7.55\% = .0755.$$

Interest on principal for 3 yr.,  $\$272 \times .18 = \$48.96$

Simple interest on this interest for 1 yr. 3 mo. 3 da.,

$$\$48.96 \times .0755 = 3.696$$

Interest on principal for 3 mo. 3 da.,  $\$272 \times .0155 = 4.216$

Total interest,  $\$56.872$

## 14.

## BY FIRST METHOD.

4 yr. 15 da. =  $24\frac{1}{4}\%$  = .2425.

Interest due on principal at end of each year,

$$\$731.29 \times .06 = \$43.877$$

1st year's interest draws simple interest for 3 yr. 15 da.

2d " " " " " " 2 " 15 "

3d " " " " " " 1 " 15 "

4th " " " " " " 15 "

Or, 1 " " " " " " 6 yr. 2 mo.

Simple interest on 1 year's interest for 6 yr. 2 mo.,

$$\$43.88 \times .37 = \$ 16.235$$

Interest on principal for 4 yr. 15 da,  $\$731.29 \times .2425 = 177.387$

Total interest,  $\$193.572$

## BY SECOND METHOD.

$$\frac{4 \text{ yr.} - 1 \text{ yr.}}{2} + 15 \text{ da.} = 1 \text{ yr. 6 mo. 15 da.} = 9\frac{1}{4}\% = .0925.$$

Interest on principal for 4 yr.,  $\$731.29 \times .24 = \$175.509$

Simple interest on this int. for 1 yr. 6 mo. 15 da.,

$$\$175.51 \times .0925 = 16.235$$

Interest on principal for 15 da.,  $\$731.29 \times .0025 = 1.828$

Total interest,  $\$193.572$

## 15.

## BY FIRST METHOD.

Int. due on principal at end of each year,  $\$356 \times .06 = \$21.36$

1st year's interest draws simple interest for 1 yr. 7 mo. 23 da.

2d " " " " " " 7 " 23 "

Or, 1 " " " " " " 2 yr. 3 mo. 16 da.

Simple interest on 1 year's interest for 2 yr. 3 mo. 16 da.,

$$\$21.36 \times .137\frac{1}{2} = \$ 2.94$$

Interest on principal for 2 yr. 7 mo. 23 da.,  $\$356 \times .158\frac{1}{2} = 56.54$

Total interest,  $\$59.48$

## BY SECOND METHOD.

$$\frac{2 \text{ yr.} - 1 \text{ yr.}}{2} + 7 \text{ mo. } 23 \text{ da.} = 1 \text{ yr. } 1 \text{ mo. } 23 \text{ da.} = 6.8\frac{1}{2}\% = .068\frac{1}{2}.$$

$$\text{Interest on principal for 2 yr., } \$356 \times .12 = \$42.72$$

$$\text{Simple interest on this interest for 1 yr. } 1 \text{ mo. } 23 \text{ da.,}$$

$$\$42.72 \times .068\frac{1}{2} = 2.94$$

$$\text{Interest on principal for 7 mo. } 23 \text{ da., } \$356 \times .088\frac{1}{2} = 13.82$$

$$\text{Total interest, } \$59.48$$

## 16.

## BY FIRST METHOD.

$$1875 \text{ yr. } 7 \text{ mo. } 10 \text{ da.} - 1868 \text{ yr. } 4 \text{ mo. } 1 \text{ da.} = 7 \text{ yr. } 3 \text{ mo. } 9 \text{ da.}$$

$$\text{Interest due on principal at end of each year, } \$100 \times .06 = \$6.00$$

$$1\text{st year's interest draws simple interest for } 6 \text{ yr. } 3 \text{ mo. } 9 \text{ da.}$$

$$2\text{d} \quad " \quad " \quad " \quad " \quad " \quad " \quad 5 \quad " \quad 3 \quad " \quad 9 \quad "$$

$$3\text{d} \quad " \quad " \quad " \quad " \quad " \quad " \quad 4 \quad " \quad 3 \quad " \quad 9 \quad "$$

$$4\text{th} \quad " \quad " \quad " \quad " \quad " \quad " \quad 3 \quad " \quad 3 \quad " \quad 9 \quad "$$

$$5\text{th} \quad " \quad " \quad " \quad " \quad " \quad " \quad 2 \quad " \quad 3 \quad " \quad 9 \quad "$$

$$6\text{th} \quad " \quad " \quad " \quad " \quad " \quad " \quad 1 \quad " \quad 3 \quad " \quad 9 \quad "$$

$$7\text{th} \quad " \quad " \quad " \quad " \quad " \quad " \quad \quad \quad 3 \quad " \quad 9 \quad "$$

$$\text{Or, } 1 \quad " \quad " \quad " \quad " \quad " \quad " \quad 22 \text{ yr. } 11 \text{ mo. } 3 \text{ da.}$$

$$\text{Simple interest on 1 year's int. for } 22 \text{ yr. } 11 \text{ mo. } 3 \text{ da.,}$$

$$\$6 \times 1.8755 = \$ 8.253$$

$$\text{Interest on principal for } 7 \text{ yr. } 3 \text{ mo. } 9 \text{ da., } \$100 \times .4865 = 48.65$$

$$\text{Total interest, } \$51.90$$

## BY SECOND METHOD.

$$\frac{7 \text{ yr.} - 1 \text{ yr.}}{2} + 3 \text{ mo. } 9 \text{ d.} = 3 \text{ yr. } 3 \text{ mo. } 9 \text{ da.} = 19.65\% = .196\frac{1}{2}.$$

$$\text{Interest on principal for 7 yr., } \$100 \times .42 = \$42.00$$

$$\text{Simple int. on this int. for } 3 \text{ yr. } 3 \text{ mo. } 9 \text{ da., } \$42 \times .196\frac{1}{2} = 8.25$$

$$\text{Interest on principal for } 3 \text{ mo. } 9 \text{ da., } \$100 \times .016\frac{1}{2} = 1.65$$

$$\text{Total interest, } \$51.90$$

18.

$$\frac{5 \text{ yr.} - 1 \text{ yr.}}{2} + 8 \text{ mo.} = 2 \text{ yr. } 8 \text{ mo.} = 16\% = .16.$$

Interest on principal for 5 yr.,	\$124 \times .3	= \$37.20
Simple interest on this int. for 2 yr. 8 mo.,	\$37.20 \times .16	= 5.95
Interest on principal for 8 mo.,	\$124 \times .04	= 4.96
Total interest,	\$	48.11
Principal,		124.00
Amount,		\$172.11

19.

Interest due on principal at end of year,  $\$65.15 \times .06 = \$3.91$ .

1 year's interest draws simple interest for 7 mo. 15 da.

Interest on 1 year's int. for 7 mo. 15 da.,	\$3.91 \times .0375	= \$ .15
Interest on prin. for 1 yr. 7 mo. 15 da.,	\$65.15 \times .0975	= 6.35
Total interest,	\$	6.50
Principal,		65.15
Amount,		\$71.65

21.

$$\frac{4 \text{ yr.} - 1 \text{ yr.}}{2} + 3 \text{ mo. } 15 \text{ da.} = 1 \text{ yr. } 9 \text{ mo. } 15 \text{ da.} = 10\frac{1}{4}\% = .1075.$$

Interest on principal for 4 yr.,	\$600 \times .24	= \$144.00
Simple interest on this interest for 1 yr. 9 mo. 15 da.,	\$144 \times .1075	= 15.48
Interest on principal for 3 mo. 15 da.,	\$600 \times .0175	= 10.50
Total interest,	\$	169.98
Principal,		600.00
Amount,		\$769.98

22.

1874 yr. 6 mo. 15 da. - 1870 yr. 10 mo. 9 da. = 3 yr. 8 mo. 6 da.

$$\frac{3 \text{ yr.} - 1 \text{ yr.}}{2} + 8 \text{ mo. } 6 \text{ da.} = 1 \text{ yr. } 8 \text{ mo. } 6 \text{ da.} = 10.1\% = .101.$$

Interest on principal for 3 yr.,	\$956 \times .18	= \$172.08
Simple interest on this interest for 1 yr. 8 mo. 6 da.,	\$172.08 \times .101	= 17.38
Interest on principal for 8 mo. 6 da.,	\$956 \times .041	= 39.196
Total interest,	\$	228.656
Principal,		956.00
Amount,		\$1,184.66

## 23.

*1st.—At Simple Interest.* $\$250 \times 1.18 = \$295$ , amount of \$250 for 3 years.*2d.—At Annual Interest.*

$$\frac{3 \text{ yr.} - 1 \text{ yr.}}{2} = 1 \text{ yr.} = 6\% = .06.$$

Interest on principal for 3 yr.,  $\$250 \times .18 = \$45.00$ Simple interest on this interest for 1 yr.,  $\$45 \times .06 = 2.70$ 

Total interest, \$ 47.70

Principal, 250.00

Amount of \$250 for 3 yr., \$297.70

*3d.—At Compound Interest.* $\$250 \times (1.06)^3 = \$297.754$ , amount of \$250 for 3 yr.

## 24.

$$\frac{2 \text{ yr.} - 1 \text{ yr.}}{2} + 6 \text{ mo.} = 1 \text{ yr.} = 6\% = .06.$$

Interest on principal for 2 yr.,  $\$500 \times .12 = \$60.00$ Simple interest on this interest for 1 yr.,  $\$60 \times .06 = 3.60$ Interest on principal for 6 mo.,  $\$500 \times .03 = 15.00$ 

Total interest, \$ 78.60

Principal, 500.00

Amount, \$578.60

## 25.

$$\frac{3 \text{ yr.} - 1 \text{ yr.}}{2} + 7 \text{ mo. } 20 \text{ da.} = 1 \text{ yr. } 7 \text{ mo. } 20 \text{ da.} = 9.8\frac{1}{2}\% = .098\frac{1}{2}.$$

Interest on principal for 3 yr.,  $\$2,000 \times .18 = \$360.00$ 

Simple interest on this interest for 1 yr. 7 mo. 20 da.,

 $\$360 \times .098\frac{1}{2} = \$35.40$ 

## 26.

$$\frac{4 \text{ yr.} - 1 \text{ yr.}}{2} + 6 \text{ mo.} = 2 \text{ yr.} = 12\% = .12.$$

Interest on principal for 4 yr.,  $\$942 \times .24 = \$226.08$ Simple interest on this int. for 2 yr.,  $\$226.08 \times .12 = 27.13$ *Carried forward.*

*Brought forward.*

Interest on principal for 6 mo., $\$942 \times .03$	=	28.26
Total interest, \$		281.47
Principal,		942.00
Amount, at annual interest, $\$1,223.47$		
Amt., at compound interest, $\$942 \times (1.06)^4 \times (1.03)$	=	1,224.93
Difference,		\$1.46

## 27.

First Balance.	Interest on unpaid interests.	Unpaid yearly interests.	Principals and amounts.
To Jan. 15, 1872, 4 yr. = 24% =.24.			
$\frac{4 \text{ yr.} - 1 \text{ yr.}}{2} = 1 \text{ yr. } 6 \text{ mo.} =$			
9% = .09.			
Mortgage,			\$4,500.00
Yearly interest on mortgage for 4 yr., $\$4,500 \times .24 =$		\$1,080.00	
Interest on these interests, $\$1,080 \times .09 =$	\$97.20		
Am't of interests due,			1,177.20
Am't of mortgage at end of 4th year, From June 1, 1871 to Jan. 15, 1872, 7 mo. 14 da. =			\$5,677.20
8.7½% = .087½.			
Am't of 1st payment for 7 mo. 14 da., $\$2,000 \times 1.087½ =$			2,074.67
New prin., or unpaid bal. on mortgage, Jan. 15, 1872,			\$3,602.53

## Final Settlement.

From Jan. 15, 1872 to Jan. 1, 1873. 11 mo. 16 da. = 5.7½% = .057½.		
Interest on new prin. for 11 mo. 16 da., $\$3,602.53 \times .057½ =$		207.75
Amount due Jan. 1, 1873,		\$3,810.28



## 28.

**First Balance.**

Interest on unpaid interests.

Unpaid yearly interests.

Principals and amounts.

To Jan. 1, 1869, 3 yr. = 18%  
=.18.

$\frac{3 \text{ yr.} - 1 \text{ yr.}}{2} = 1 \text{ yr.} = 6\% = .06.$

*Principal,*

\$5,000.00

Yearly interest on principal  
for 3 yr., \$5,000  $\times$  .18 =

\$900.00

*Interest on these interests,*\$900  $\times$  .06 = \$54.00*Am't of interests due,*

\$954.00.

*From June 1, 1868 to Jan.*1, 1869, 7 mo. =  $3\frac{1}{2}\%$  = .035.

*Am't of 1st payment for 7  
mo., (less than interest  
due) \$500  $\times$  1.035 =*

\$517.50.

*Balance of unpaid yearly interests and  
principal, Jan. 1, 1869,*

\$436.50 \$5,000.00

**Second Balance.***From Jan. 1, 1869 to Jan.*

1, 1872, 3 yr. = 18% = .18.

$\frac{3 \text{ yr.} - 1 \text{ yr.}}{2} = 1 \text{ yr.} = 6\% = .06.$

Yearly interest on principal  
for 3 yr., \$5,000  $\times$  .18 =

900.00

Interest on unpaid yearly  
interests for 3 yr.,

\$436.50  $\times$  .18 = \$78.57

Interest on accrued yearly  
interests, \$900  $\times$  .06 =

54.00

*Am't of interests due,*

\$1,469.07.

*From May 1, 1871 to Jan.*

1, 1872, 8 mo. = 4% = .04.

*Am't of payment for 8 mo.  
(less than interest due),*

\$1000  $\times$  1.04 = \$1,040.00.

*Unpaid balances, Jan. 1, 1872,*

\$429.07 \$5,000.00

**Final Settlement.***From Jan. 1, 1872 to Oct. 1,*

1874, 2 yr. 9 mo. =

16.5% = .165.

*Carried forward.*

*Brought forward.*

$\frac{2 \text{ yr.} - 1 \text{ yr.}}{2} + 9 \text{ mo.} = 1 \text{ yr. } 3 \text{ mo.}$	Interest on unpaid interests.	Unpaid yearly interests.	Principals and amounts.
$\text{mo.} = 7\frac{1}{2}\% = .075.$			
Yearly interest on principal for 2 yr., $\$5,000 \times .12 =$		600.00	
Interest on these interests for 1 yr. 3 mo., $\$600 \times .075 =$	\$ 45.00		
Interest on principal for 9 mo., $\$5,000 \times .045 =$		225.00	
Interest on unpaid interests for 2 yr. 9 mo., $\$429.07 \times .165 =$	70.80		
Am't of interests due,			<u>1,369.87</u>
Last payment, or amount due Oct. 1, 1874,			<u>\$6,369.87</u>

29.

**First Balance.**

To Sept. 5, 1869, 1 yr. = 6%  
=.06.

Mortgage,		\$2,500.00
Interest on mortgage for 1 yr., $\$2,500 \times .06 =$	\$ 150.00	
Am't of mortgage at end of yr.,		<u>\$2,650.00</u>
From April 1 to Sept. 5, 1869, 5 mo. 4 da. = $2.5\frac{1}{2}\% = .025\frac{1}{2}.$		
From Aug. 25 to Sept. 5, 1869, 10 da. = $.1\frac{1}{2}\% = .001\frac{1}{2}.$		
Am't of 1st payment for 5 mo. 4 da., $\$125 \times 1.025\frac{1}{2} =$		
	\$128.21.	
Am't of 2d payment for 10 da., $\$475 \times 1.001\frac{1}{2} =$		
	\$475.79.	
Sum of the amounts of the two payments,		<u>604.00</u>
New prin., or unpaid bal. on mortgage, Sept. 5, 1869,		<u>\$2,046.00</u>

**Final Settlement.**

From Sept. 5, 1869 to Jan. 1, 1874, 4 yr. 3 mo. 26 da.  
 $\frac{4 \text{ yr.} - 1 \text{ yr.}}{2} + 3 \text{ mo. } 26 \text{ da.} =$

*Carried forward.*

*Brought forward.*

	Interest on unpaid interests.	Unpaid yearly interests.	Principals and amounts.
1 yr. 9 mo. 26 da. = $10.9\frac{1}{2}\%$ = .109 $\frac{1}{2}$ .			
3 mo. 26 da. = $1.9\frac{1}{2}\%$ = .019 $\frac{1}{2}$ .			
Yearly interests on prin. for 4 yr., $\$2,046 \times .24 =$		\$ 491.04	
Interest on accrued yearly interests for 1 yr. 9 mo. 26 da., $\$491.04 \times .109\frac{1}{2} =$	\$ 53.69		
Interest on principal for 3 mo. 26 da., $\$2,046 \times .019\frac{1}{2} =$		39.56	
Am't of interests due,			584.29
Last payment, Jan. 1, 1874,			\$ 2,630.29

## 30.

**First Balance.**

2 yr. = $12\% = .12$ .			
2 yr. - 1 yr. = 6 mo. = $3\% = .03$ .			
Mortgage, $\$2,750 - \$1,000 =$			\$ 1,750.00
Interest on mortgage for 2 yr., $\$1,750 \times .12 =$		\$ 210.00	
Interest on this interest for 6 mo., $\$210 \times .03 =$	\$ 6.30		
Am't of interests due,			216.30
Am't of mortgage at end of 2d yr.,			\$ 1,966.30
Am't of payment for 6 mo., $\$842 \times 1.03 =$			867.26
New prin., or unpaid bal. of mortgage, at end of 2 yr.,			\$ 1,099.04

**Final Settlement.**

2 yr. = $12\% = .12$ .			
2 yr. - 1 yr. = 6 mo. = $3\% = .03$ .			
Interest on mortgage for 2 yr., $\$1,099.04 \times .12 =$		\$ 131.88	
Interest on this interest, for 6 mo., $\$131.88 \times .03 =$	\$ 3.96		
Am't of interests due,			135.84
Am't due on mortgage at maturity,			\$ 1,234.88

## 31.

**First Balance.**

	Interest on unpaid interests.	Unpaid yearly interests.	Principals and amounts.
To Nov. 7, 1868, 1 yr. = 6% = .06.			
Loan,			\$ 10,000.00
Interest on loan for 1 yr.,			
\$10,000 × .06 =		\$ 600.00	
		<hr/>	<hr/>
Am't of loan, Nov. 7, 1868,			\$ 10,600.00
From June 28 to Nov. 7,			
1868, 4 mo. 9 da. = 2.15% = .0215.			
Am't of payment for 4 mo.			
9 da., \$4,800 × 1.0215 =			4,903.20
		<hr/>	<hr/>
New prin., or amount due, Nov. 7, 1868,			\$ 5,696.80

**Second Balance.**

To Nov. 7, 1871, 3 yr. = 18% = .18.			
3 yr. - 1 yr. = 1 yr. = 6% = .06.			
2			
Interest on new prin. for 3 yr.,	\$ 1,025.42		
\$5,696.80 × .18 =			
Interest on this interest for 1 yr.,	\$ 61.53		
\$1,025.42 × .06 =			
Am't of interest due,			1,086.95
			<hr/>
Whole amount due Nov. 7, 1871,			\$ 6,783.75
From July 14 to Nov. 7, 1871, 3 mo. 23 da. = 1.8½% = .018½.			
Am't of payment for 3 mo. 23 da.,			
\$3,750 × 1.018½ =			3,820.63
		<hr/>	<hr/>
New prin., or amount due, Nov. 7, 1871,			\$ 2,963.12

**Final Settlement.**

From Nov. 7, 1871 to Jan. 3, 1874, 2 yr. 1 mo. 26 da.			
2 yr. - 1 yr. = 1 yr. = 6% = .06.			
2			
7 mo. 26 da. = 8.9¼% = .089¼.			
Interest on new prin. for 2 yr.,	\$ 355.57		
\$2,963.12 × .12 =			
			Carried forward.

*Brought forward.*

<i>Interest on this interest for</i>	<i>Interest on unpaid interests.</i>	<i>Unpaid yearly interests.</i>	<i>Principals and amounts.</i>
<i>7 mo. 26 da.,</i> $\$355.57 \times .039 \frac{1}{2} =$	$\$ 13.99$		
<i>Interest on new prin. for 1</i> <i>mo. 26 da.,</i> $\$2,963.12 \times .009 \frac{1}{2} =$		27.66	
<i>Am't of interests due,</i>			397.22
<i>Sum due, Jan. 3, 1874,</i>			<u><u>\\$3,360.34</u></u>

## 32.

**First Balance.**

<i>To March 14, 1872, 2 yr. =</i> $12\% = .12$ $\frac{2 \text{ yr.} - 1 \text{ yr.}}{2} = 6 \text{ mo.} = 3\% = .03$			
<i>Principal,</i>			$\$576.00$
<i>Interest on prin. for 2 yr.,</i> $\$576 \times .12 =$	$\$69.12$		
<i>Interest on this interest for</i> <i>6 mo.,</i> $\$69.12 \times .03 =$	$\$2.07$		
<i>Am't of interests due, \\$71.19.</i>			
<i>From Oct. 31, 1871 to March</i> <i>14, 1872, 4 mo. 14 da. =</i> $2.2\frac{1}{2}\% = .022\frac{1}{2}$			
<i>Am't of payment for 4 mo.</i> <i>14 da. (less than interest</i> <i>due), <math>\\$50 \times 1.022\frac{1}{2} =</math></i>			$\$51.12$
<i>Balance of unpaid interests and principal</i> <i>to March 14, 1872,</i>	$\$20.07$		$\$576.00$

**Second Balance.**

<i>To March 14, 1873, 1 yr. =</i> $6\% = .06$			
<i>Interest on prin. for 1 yr.,</i> $\$576 \times .06 =$		34.56	
<i>Interest on unpaid interest,</i> $\$20.07 \times .06 =$	$\$1.20$		
<i>Am't of interests due,</i>			55.83
<i>Am't of note, March 14, 1873,</i>			<u><u>\\$631.83</u></u>
			<i>Carried forward.</i>

*Brought forward.*

	Interest on unpaid interests.	Unpaid yearly interests.	Principals and amounts.
From June 11, 1872 to March 14, 1873, 9 mo. 8 da. = $4.5\frac{1}{2}\% = .0455$ .			
Am't of payment for 9 mo. 8 da., $\$285 \times 1.0455 =$			297.97
New prin., March 14, 1873,			<u>\$333.86</u>

**Final Settlement.**

From March 14 to Sept. 25, 1873, 6 mo. 11 da. = $3.1\frac{1}{2}\% = .031\frac{1}{2}$ .			
Int. on principal for 6 mo. 11 da., $\$333.86 \times .031\frac{1}{2} =$		\$10.63	
Amount due, Sept. 25, 1873.			<u>\$344.49</u>

**33.****First Balance.**

To Jan. 1, 1869, 4 yr. = $24\% = .24$ .			
4 yr. - 1 yr. = 1 yr. 6 mo. = $\frac{3}{2}$ .			
.03.			
Mortgage.			\$5,000.00
Interest on mortgage for 4 yr., $\$5,000 \times .24 =$		\$1,200.00	
Interest on this interest for 1 yr. 6 mo., $\$1,200 \times .09 =$	\$108.00		
From July 1, 1868 to Jan. 1, 1869, 6 mo. = $8\% = .08$ .			
Am't of 1st payment for 6 mo., (less than simple int. due on unpaid yearly interest), $\$50 \times 1.08 =$	51.50		
Unpaid balances, Jan. 1, 1869,	\$56.50	\$1,200.00	<u>\$5,000.00</u>

**Second Balance.**

To Jan. 1, 1870, 1 yr. = $6\% = .06$ .			
Interest on mortgage for 1 yr., $\$5,000 \times .06 =$		300.00	
			<i>Carried forward.</i>

<i>Brought forward.</i>	Interest on unpaid interests.	Unpaid yearly interests.	Principals and amounts.
<i>Interest on unpaid yearly interests, \$1,200 × .06 =</i>	72.00		
<i>Am't of interest due on unpaid yearly interests, \$128.50</i>			
<i>From Nov. 1, 1869 to Jan. 1, 1870, 2 mo. = 1½ = .01.</i>			
<i>Am't of 2d payment for 2 mo. (less than simple int. due on unpaid yearly interests), \$100 × 1.01 =</i>	101.00		
<i>Unpaid balances, Jan. 1, 1870,</i>	<i>\$27.50</i>	<i>\$1,500.00</i>	<i>\$5,000.00</i>

**Third Balance.**

<i>To Jan. 1, 1871, 1 yr. = 6% = .06.</i>			
<i>Interest on mortgage for 1 yr., \$5,000 × .06 =</i>		300.00	
<i>Interest on unpaid yearly interests, \$1,500 × .06 =</i>	90.00		
<i>Am't of interests due.</i>			1,917.50
<i>Total of prin. and interests due, Jan. 1, 1871,</i>			<i>\$6,917.50</i>
<i>From Dec. 1, 1870 to Jan. 1, 1871, 1 mo. = ½% = .005.</i>			
<i>Am't of 3d payment for 1 mo., \$2,000 × 1.005 =</i>			2,010.00
<i>New prin. or unpaid balance on mortgage, Jan. 1, 1871,</i>			<i>\$4,907.50</i>

**Fourth Balance.**

<i>To Jan. 1, 1872, 1 yr. = 6% = .06.</i>			
<i>Interest on mortgage for 1 yr., \$4,907.50 × .06 =</i>		\$294.45	
<i>Am't of mortgage, Jan. 1, 1872,</i>			<i>\$5,201.95</i>
<i>From April 1, 1871 to Jan. 1, 1872, 9 mo. = 4½% = .045.</i>			
<i>From Nov. 1, 1871 to Jan. 1 1872, 2 mo. = 1% = .01.</i>			
<i>Am't of 4th payment for 9 mo., \$25 × 1.045 = \$26.13</i>			

*Carried forward.*

*Brought forward.*

<i>Am't of 5th payment for 2 mo.,</i>	<i>Interest on unpaid interests.</i>	<i>Unpaid yearly interests.</i>	<i>Principals and amounts.</i>
$\$2,000 \times 1.01 = \$2,020.00$			
<i>Sum of the amounts of 4th and 5th payments,</i>			<u>2,046.13</u>
<i>New prin. or unpaid balance on mortgage, Jan. 1, 1873,</i>			<u>\$3,155.82</u>

**Fifth Balance.**

To Jan. 1, 1875, 3 yr. = 18%  
= .18.

$\frac{3 \text{ yr.} - 1 \text{ yr.}}{2} = 1 \text{ yr.} = 6\% = .06.$

*Interest on mortgage for 3 yr.,*  $\$3,155.82 \times .18 =$

$\$568.05$

*Interest on this interest for*

*1 yr.,*  $\$568.05 \times .06 = \$34.08$

*From June 1, 1874 to Jan.*

*1, 1875, 7 mo. =  $3\frac{1}{2}\%$  = .035.*

*Am't of 6th payment for 7*

*mo. (less than simple int.*

*due on unpaid yearly in-*

*terests),*  $\$20 \times 1.035 = 20.70$

*Unpaid balances, Jan. 1, 1875.*

$\$13.38$

$\$568.05$

$\$3,155.82$

**Final Settlement.**

To June 20, 1875, 5 mo. 19  
da. =  $2.8\frac{1}{2}\%$  = .028 $\frac{1}{2}$ .

*Interest on mortgage for*

*5 mo. 19 da.,*

$\$3,155.82 \times .028\frac{1}{2} =$

88.89

*Interest on unpaid yearly*

*interests,  $\$568.05 \times .028\frac{1}{2} =$*

16.00

*Am't of interests due,*

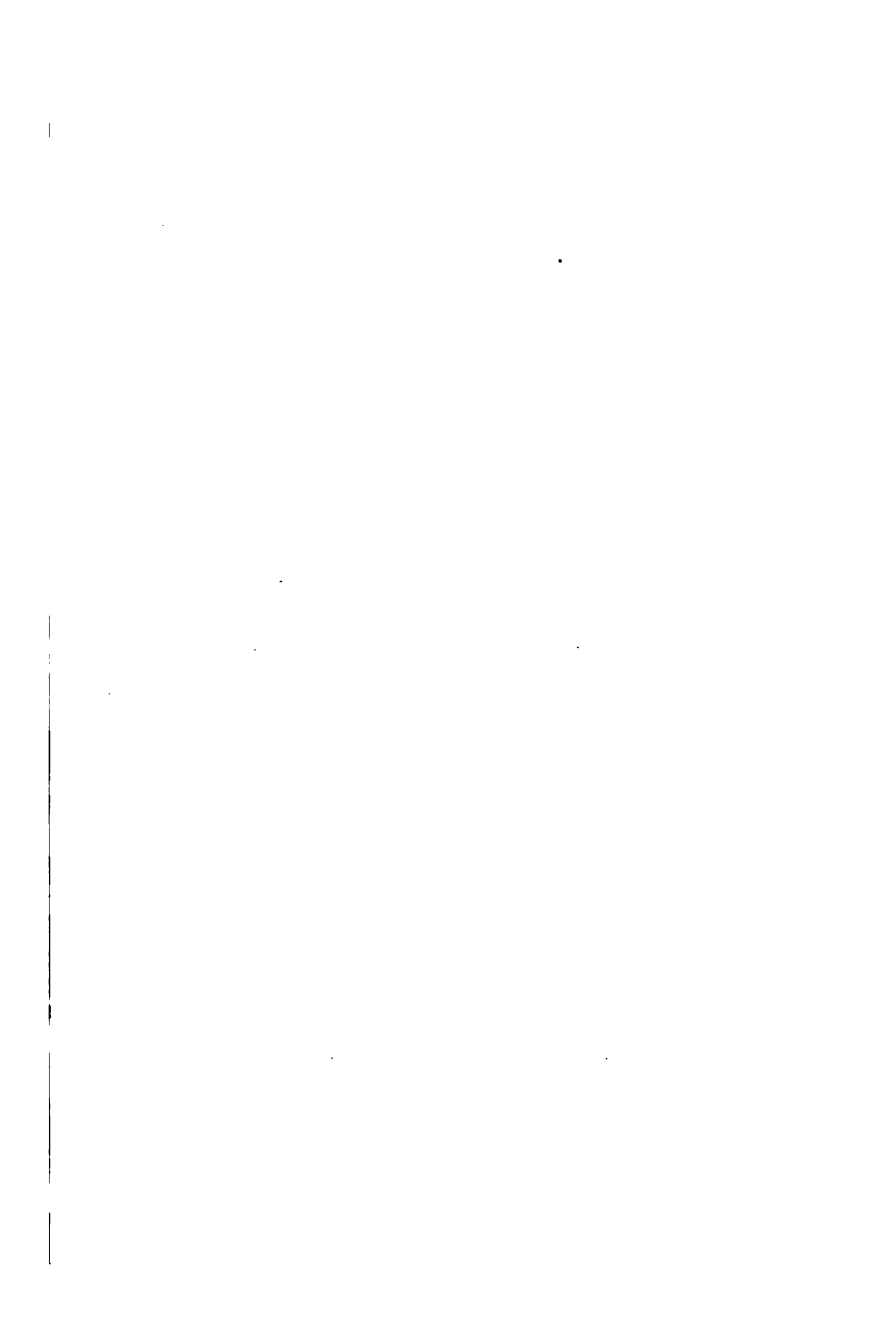
$\$686.32$

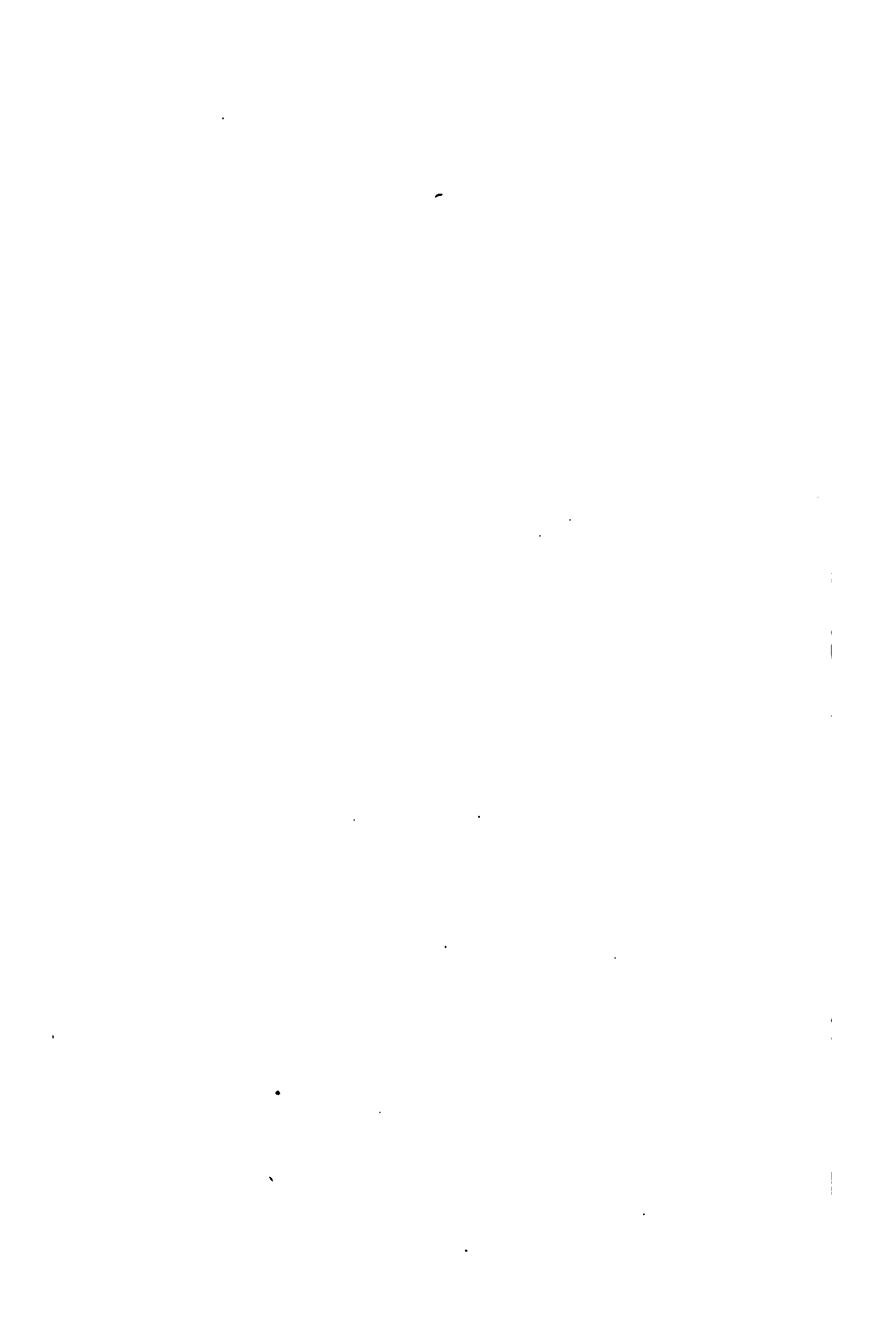
*Last payment, June 20, 1875,*

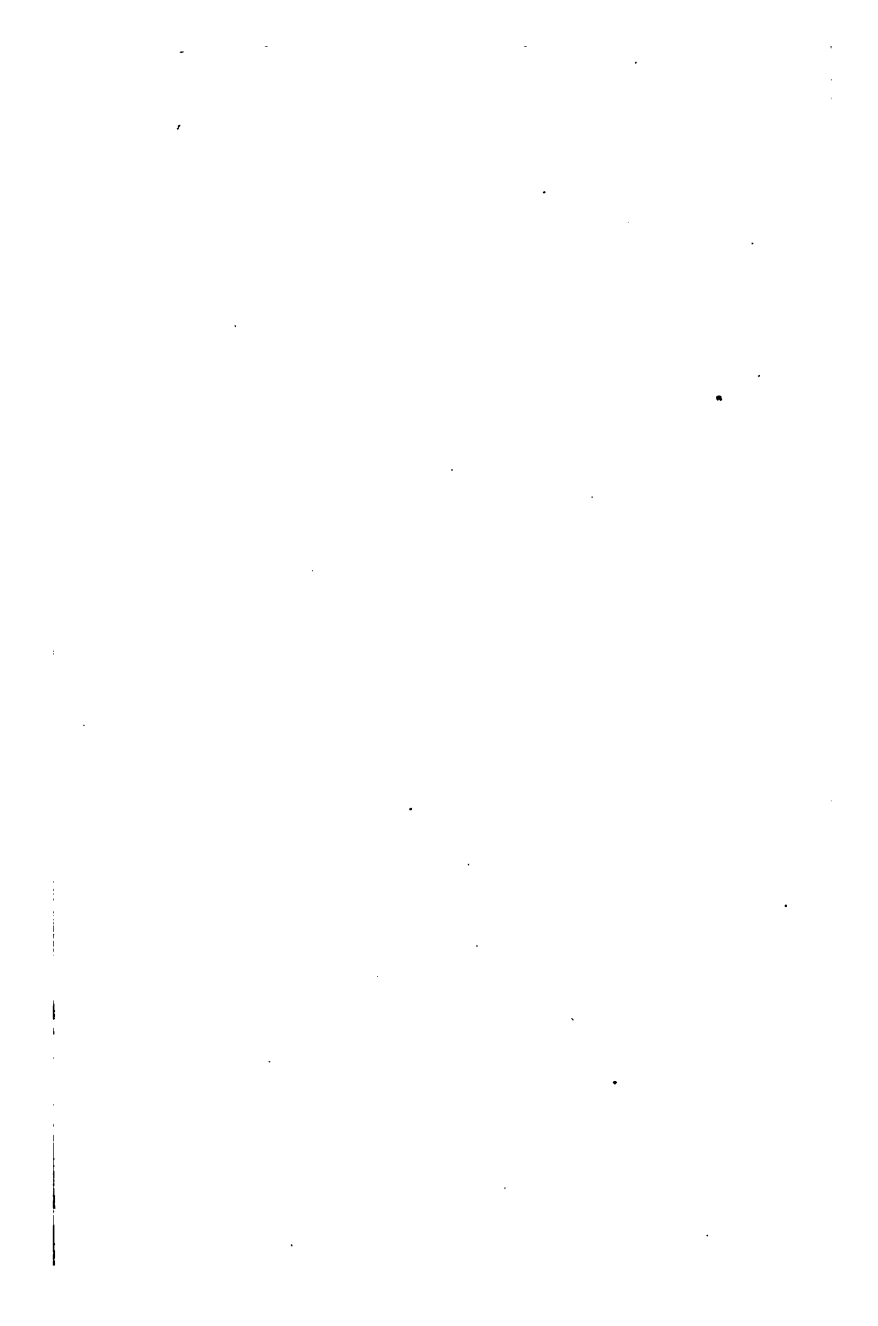
$\$3,842.14$

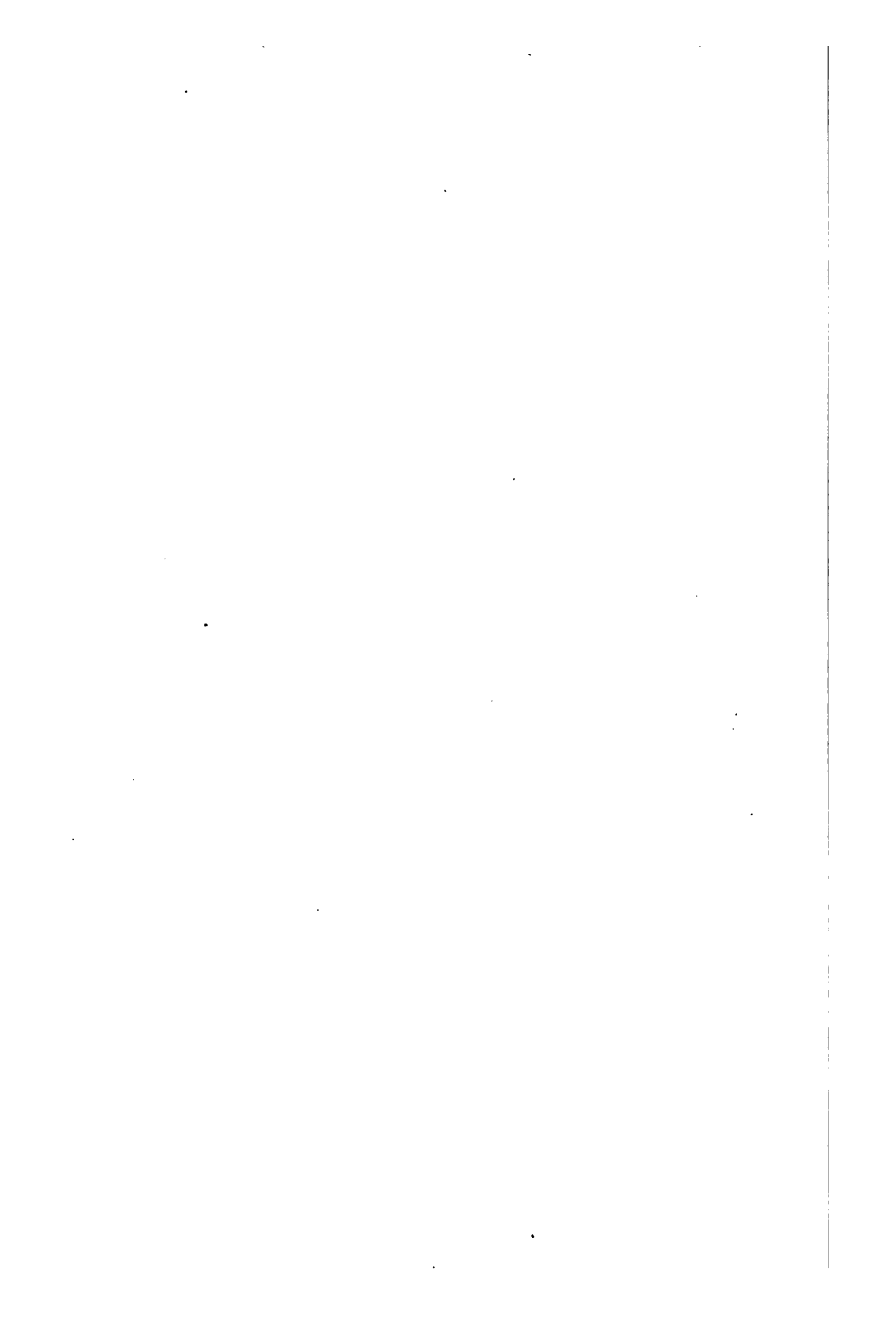


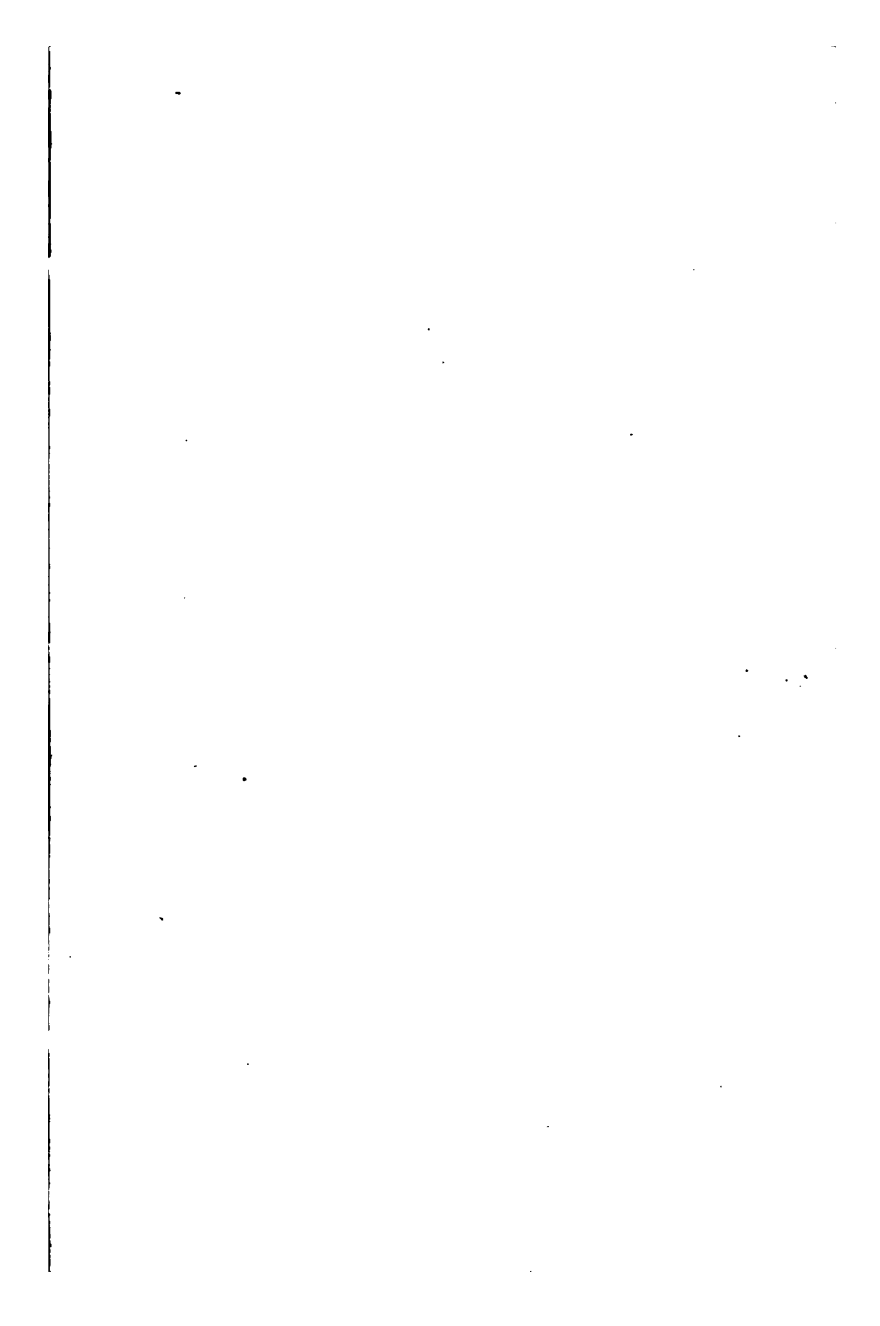


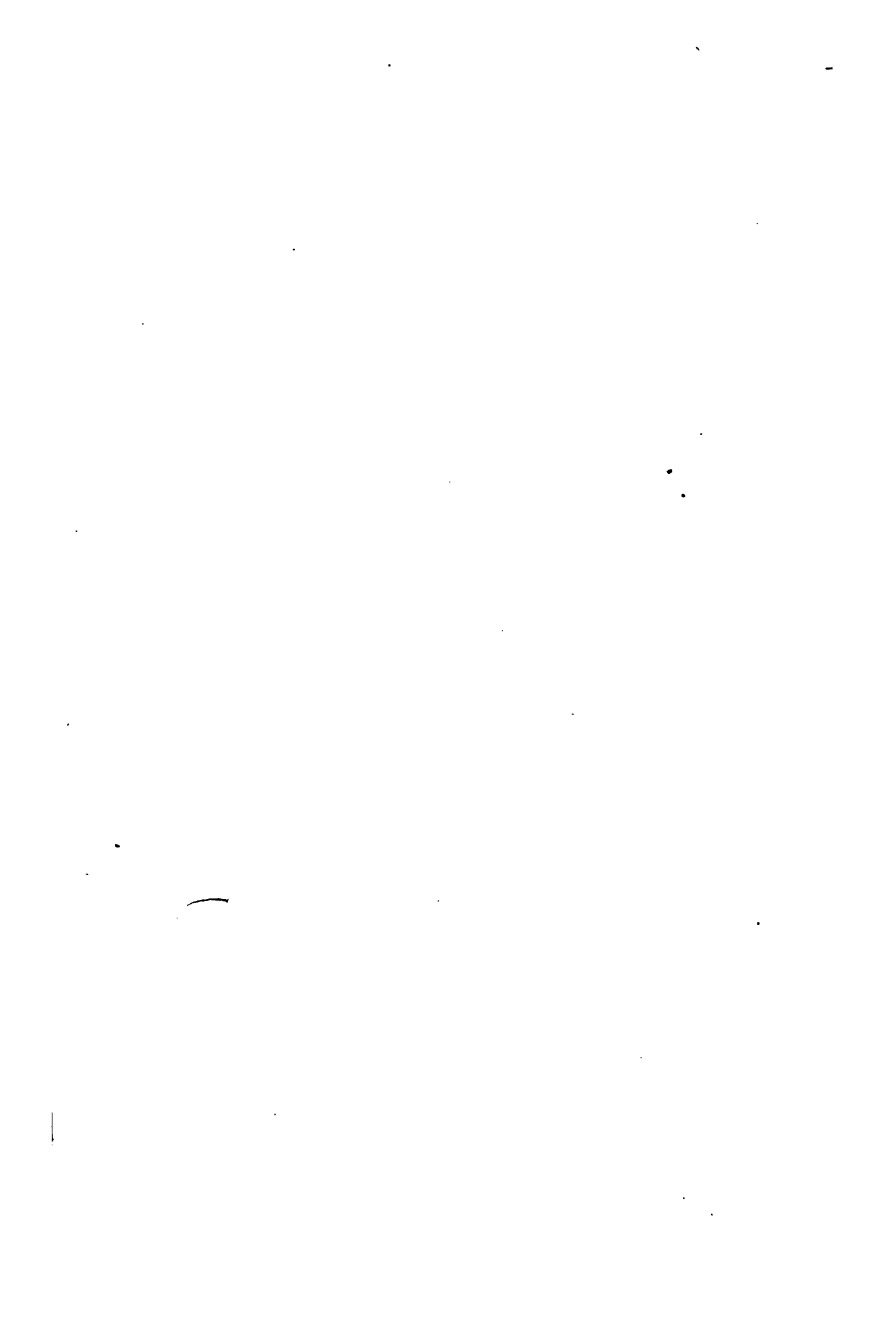












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